Measurement of RF Emissions from a 28275847 Car Radio Transmitter

For	Delphi Electronics and Safety One Corporate Center Kokomo, IN 46904
P.O. Number	451426107
Date Tested	February 7 through 24, 2012
Test Personnel	Richard King
Test Specification	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Section 15.247 for Frequency Hopping Spread Spectrum Intentional Radiators within The bands 2400-2483.5MHz Industry Canada RSS-GEN Industry Canada RSS-210

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REVISION HISTORY

Revision	Date	Description
—	21 March 2012	Initial release

Measurement of RF Emissions from a Car Radio, Model No. 28275847 Transmitter

1. INTRODUCTION

1.1. Scope of Tests

This report represents the results of the series of radio interference measurements performed on a Delphi Electronics and Safety Car Radio, Model No. 28275847, Serial No. S/N 1, transmitter (hereinafter referred to as the test item). The test item is a Bluetooth hybrid frequency hopping spread spectrum transmitter. The transmitter was designed to transmit in the 2400-2483.5 MHz band using an integral antenna. The test item was manufactured and submitted for testing by Delphi Electronics and Safety located in Kokomo, IN.

1.2. Purpose

The test series was performed to determine if the test item meets the conducted and radiated RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, Sections 15.207 and 15.247 for Intentional Radiators. The test series was also performed to determine if the test item meets the conducted RF emission requirements of the Industry Canada (IC) Radio Standards Specification, RSS-Gen, Section 7.2.2 and the radiated RF emission requirements of the Industry Canada Radio Standards Specification, RSS-210, and Annex 8 for transmitters. Testing was performed in accordance with ANSI C63.4-2009.

1.3. Deviations, Additions and Exclusions

There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4. EMC Laboratory Identification

This series of tests was performed by Elite Electronic Engineering Incorporated of Downers Grove, Illinois. The laboratory is accredited by The American Association for Laboratory Accreditation (A2LA). A2LA Certificate Number: 1786.01.

1.5. Laboratory Conditions

The temperature at the time of the test was 22.4^{o}C and the relative humidity was 42%.

2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 15, Subpart C, dated 1 October 2011
- ANSI C63.4-2009, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- FCC Public Notice, DA 00-705, "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", Released March 30, 2000
- Industry Canada Radio Standards Specification, RSS-Gen, “General Requirements and Information for the Certification of Radiocommunication Equipment”, Issue 3, December 2010
- Industry Canada Radio Standards Specification, RSS-210, “Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment”, Issue 8, December 2010

3. EUT SETUP AND OPERATION

3.1. General Description

The EUT is a Delphi Electronics and Safety, Car Radio, Model No. 28275847. A block diagram of the EUT setup is shown as Figure 1.

3.1.1. Power Input

The EUT obtained 13.6 VDC power via a 1 foot wiring harness.

3.1.2. Peripheral Equipment

The following peripheral equipment was submitted with the EUT:

Item	Description
Load Box	Delphi Load box to supply proper loading characteristics to EUT
Dell	Dell laptop to control the EUT functions

3.1.3. Signal Input/Output Leads

The following interconnect cables were submitted with the EUT:

Item	Description
Wiring harness	1 foot long from the EUT to the load box
USB cable	30 feet of USB cable from laptop to the load box inside test chamber

3.1.4. Grounding

The EUT was grounded only through a tin braid strap from the chassis to the ground plane.

3.2. Operational Mode

For all tests the EUT and all peripheral equipment were placed on an 80cm high non-conductive stand. The EUT and all peripheral equipment were energized.

For all tests, the test item was placed on an 80cm high non-conductive stand. The test item was energized. The unit was programmed to operate in one of the following modes:

- Transmit at 2402MHz
- Transmit at 2441MHHz
- Transmit at 2480MHHz
- Frequency Hopping Enabled
- Inquiry Mode

3.3. EUT Modifications

No modifications were required for compliance to the requirements.

4. TEST FACILITY AND TEST INSTRUMENTATION

4.1. Shielded Enclosure

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. With the exception of the floor, the reflective surfaces of the shielded chamber are lined with ferrite tiles on the walls and ceiling. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2009 for site attenuation.

4.2. Test Instrumentation

The test instrumentation and auxiliary equipment used during the tests are listed in Table 9-1.

4.3. Calibration Traceability

Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.4. Measurement Uncertainty

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

The measurement uncertainty for these tests is presented below:

Conducted Emissions Measurements		
Combined Standard Uncertainty	1.07	-1.07
Expanded Uncertainty (95% confidence)	2.1	-2.1

Radiated Emissions Measurements		
Combined Standard Uncertainty	2.26	-2.18
Expanded Uncertainty (95% confidence)	4.5	-4.4

5. TEST PROCEDURES

5.1. Powerline Conducted Emissions

5.1.1.Requirements

Since the EUT was powered 13.6 VDC from an automotive source, no conducted emission measurements are required.

5.2. 20dB Bandwidth

5.2.1.Requirement

Per section 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate within an output power no greater than 125mW.

5.2.2.Procedures

The test item was setup inside the chamber. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The resolution bandwidth (RBW) was set to > to 1% of the 20 dB BW. The span was set to approximately 2 to 3 times the 20 dB bandwidth.

The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

5.2.3.Results

The plots on pages 20 through 22 show that the maximum 20 dB bandwidth was 861.7kHz. The 99% bandwidth was measured to be 821.64kHz.

5.3. Carrier Frequency Separation

5.3.1.Requirements

Frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate within an output power no greater than 125mW.

5.3.2.Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to > to 1% of the span. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the peaks of at least two adjacent channels. When the trace had stabilized after multiple scans, the marker-delta function was used to determine the separation between the peaks of the adjacent channels. The analyzer's display was plotted using a 'screen dump' utility

5.3.3.Results

Page 23 shows the carrier frequency separation. As can be seen from this plot, the carrier frequency separation is 977.95 kHz which is greater than the 20dB bandwidth of the hopping channel (861.7kHz).

5.4. Number of Hopping Frequencies

5.4.1.Requirements

Frequency hopping systems operating in the 2400- 2483.5MHz band that employ at least 75 non-overlapping hopping channels must have a maximum peak conducted output power that does not exceed 1W (30dBm).

5.4.2.Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to > to 1% of the span. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the entire frequency band of operation.

The test item’s signal was allowed to stabilize after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

5.4.3.Results

Page 24 shows the number of hopping frequencies. As can be seen from this plot, the number of hopping frequencies is 79 which is equal to (or greater than) 75 which is the minimum number of required hopping frequencies for systems operating in the 2400-2483.5MHz band that have a maximum peak conducted output power that does not exceed 1W (30dBm).

5.5. Time of Occupancy

5.5.1.Requirements

For frequency hopping systems operating in the 2400-2483.5MHz band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

5.5.2.Procedures

The test item was setup inside the chamber. With the hopping function enabled, the test item was allowed to transmit continuously.

The resolution bandwidth (RBW) was set to 1 MHz. The peak detector and 'Max-Hold' function were engaged. With the span set to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. The analyzer's display was plotted using a 'screen dump' utility. Then, the sweep time was expanded to 31.6 seconds.

5.5.3.Results

Pages 25 and 26 show the plots for the time of occupancy (dwell time). As can be seen from the plots, the time of occupancy can be determined by 380.7 uS multiplied by 347.6 hops in 31.6 seconds. This calculated value is equal to .1326 seconds which is less than the 0.4 seconds maximum allowed.

5.6. Peak Output Power

5.6.1.Requirements

For frequency hopping systems operating in the 2400-2483.5MHz band and employing at least 75 non-overlapping hopping channels, the maximum peak output conducted power shall not be greater than 1W (30dBm). Per section 15.247(b)(4), this limit is based on the use of antennas with directional gains that do not exceed 6dBi. Since the limit allows for a 6dBi antenna gain, the maximum EIRP can be increased by 6dB to 4 Watt (36dBm).

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below 30dBm by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.6.2.Procedures

The test item was placed on the non-conductive stand and set to transmit. A dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was placed at a test distance of 3 meters from the test item. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 20dB bandwidth. The span was set to approximately 5 times the 20 dB bandwidth. The test item was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle and high hopping frequencies.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a second dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was then set in place of the test item and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss (and antenna gain for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.

5.6.3.Results

The results are presented on page 28. The maximum EIRP measured from the transmitter was -7.5 dBm or .178 mW which is below the 4 Watt limit.

5.7. Radiated Spurious Emissions Measurements

5.7.1.Requirements

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Paragraph 15.209(a) has the following radiated emission limits:

Frequency MHz	Field Strenght (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30.0-88.0	100	3
88.0-216.0	150	3
216.0-960.0	200	3
Above 960	500	3

5.7.2.Procedures

All tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2009 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the test item. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the test item. The entire frequency range from 30MHz to 25GHz used for 2400-2483.5Mhz range was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz used for 2400-2483.5MHz range.

1) For all harmonics not in the restricted bands, the following procedure was used:
   a) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
   c) To ensure that maximum or worst case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
      i) The test item was rotated so that all of its sides were exposed to the receiving antenna.
      ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
      iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
      iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the test item was rotated through all axis to ensure the maximum readings were recorded for the test item.
   d) All harmonics not in the restricted bands must be at least 20 dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.

2) For all emissions in the restricted bands, the following procedure was used:
   a) The field strengths of all emissions below 1 GHz were measured using a bi-log antenna. The bi-log

antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.

b) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.

c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
   i) The test item was rotated so that all of its sides were exposed to the receiving antenna.
   ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
   iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
   iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead the test item was rotated through all axis to ensure the maximum readings were recorded for the test item.

d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.

e) For all radiated emissions measurements above 1 GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).

f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken.

If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a “duty cycle correction factor”, derived from 20*log(dwell time/100msec). These readings must be no greater than the limits specified in 15.209(a).

5.7.3. Results

Preliminary radiated emissions plots with the test item transmitting at Low Frequency, Middle Frequency, and High Frequency are shown on pages 29 through 52. Final radiated emissions data are presented on data pages 53 through 59. As can be seen from the data, all emissions measured from the test item were within the specification limits.

Photographs of the test configuration which yielded the highest, or worst case, radiated emission levels are shown on Figures 3.

5.8. Band Edge Compliance

5.8.1. Requirement

Per section 15.247(d), the emissions at the band-edges must be at least 20dB below the highest level measured within the band but attenuation below the general limits listed in 15.209(a) is not required.

In addition, the radiated emissions which fall in the restricted band beginning at 2483.5 MHz must meet the general limits of 15.209(a).

5.8.2.Procedures

5.4.2.1 Low Band Edge

1) The test item was setup inside the test chamber on a non-conductive stand.
2) A broadband measuring antenna was placed at a test distance of 3 meters from the test item.
3) The test item was set to transmit continuously at the channel closest to the low band-edge (hopping function disabled).
4) The test item was maximized for worst case emissions at the measuring antenna. The maximum meter reading was recorded.
5) To determine the bandedge compliance, the following spectrum analyzer settings were used:
    a. Center frequency = low band-edge frequency.
    b. Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.
    c. Resolution bandwidth (RBW) ≥ 1% of the span.
    d. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
    e. The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.)
    f. The analyzer's display was plotted using a 'screen dump' utility.
6) Step (5) was repeated with the frequency hopping function enabled.

5.4.2.2 High Band Edge

1) The test item was set to transmit continuously at the channel closest to the high band-edge (hopping function disabled).
2) A double ridged waveguide was placed 3 meters away from the test item. The antenna was connected to the input of a spectrum analyzer.
3) The center frequency of the analyzer was set to the high band edge (2483.5MHz)
4) The resolution bandwidth was set to 1MHz.
5) To ensure that the maximum or worst case emission level was measured, the following steps were taken:
    a. The test item was rotated so that all of its sides were exposed to the receiving antenna.
    b. Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
    c. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
6) The highest measured peak reading was recorded.
7) The highest measured average reading was recorded.
8) Steps 1 through 7 were repeated with the hopping enabled.

5.8.3. Results

Pages 60 through 65 show the radiated band-edge compliance results. As can be seen from these plots, the radiated emissions at the low end band edge are within the 20 dB down limits. The radiated emissions at the high end band edge are within the general limits.

5.9. Power Spectral Density

5.9.1. Requirements

Per section 15.247(d), the peak power spectral density from the intentional radiator shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.9.2. Procedures

1) The test item was placed on the non-conductive stand and set to transmit at a mid channel.
2) A broadband measuring antenna was placed near the test item.
3) To determine the power spectral density, the following spectrum analyzer settings were used for

Channel 1:

a. Center frequency = transmit frequency
b. Span = 1MHz or wider
c. Resolution bandwidth (RBW) greater than the 6dB bandwidth.
d. Sweep time = auto
e. The peak detector and 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined.
f. Channel 1 of the spectrum analyzer was placed in ‘View’ mode.
g.

4) This reading corresponds to the peak output power measured for the mid channel.
5) Turn on the display line and place it at the corresponding +8dBm level. (e.g. if the peak output power is +18dBm then the +8dBm level will be 10dB down from the radiated level and if the peak output power is +6dBm then the +8dBm level will be 2dB above the radiated level.)
6) The test item was then placed in the inquiry mode (for Bluetooth device)
7) To determine the power spectral density, the following spectrum analyzer settings were used for

Channel 2:

a. Center frequency = transmit frequency
b. Span = 1MHz or wider
c. Resolution bandwidth (RBW) = 3kHz
d. Sweep time = span divided by RBW = (for example :1MHz/3kHz = 333 seconds)
e. The peak detector and 'Max-Hold' function was engaged.
f. The display line represents the 8 dBm limit
g. The analyzer's display was plotted using a 'screen dump' utility.

6. OTHER TEST CONDITIONS

6.1. Test Personnel and Witnesses

All tests were performed by qualified personnel from Elite Electronic Engineering Incorporated.

6.2. Disposition of the EUT

The EUT and all associated equipment were returned to Delphi Electronics and Safety upon completion of the tests.

7. CONCLUSIONS

It was determined that the Delphi Electronics and Safety Car Radio, Model No. 28275847, did fully meet the conducted and radiated emission requirements of the FCC and IC for Intentional Radiators, when tested per ANSI C63.4-2009.

8. CERTIFICATION

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the EUT at the test date. Any electrical or mechanical modification made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

9. EQUIPMENT LIST

Table 9-1 Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW1	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G-3R0	PL2927/0646	20GHZ-26.5GHZ	8/5/2011	8/5/2012
APW3	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-35-120-5R0-10-12	PL2924	1GHZ-20GHZ	6/3/2011	6/3/2012
GXA1	MXG MW ANALOG SIGNAL GENERATOR	AGILENT TECHNOLOGIES	N5183A	MY47420353	250KHz-40GHz	2/27/2012	2/27/2013
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NHH0	STANDARD GAIN HORN ANTENNA	NARDA	V637	---	26.5-40GHZ	NOTE 1	
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	11/3/2011	11/3/2012
NWI0	RIDGED WAVE GUIDE	AEL	H1498	153	2-18GHZ	1/28/2012	1/28/2013
NWI1	RIDGED WAVE GUIDE	AEL	H1498	154	2-18GHZ	1/28/2012	1/28/2013
RBB0	EMI TEST RECEIVER 20HZ TO 40 GHZ.	ROHDE & SCHWARZ	ESIB40	100250	20 HZ TO 40GHZ	3/5/2012	3/5/2013
XOB2	ADAPTER	HEWLETT PACKARD	K281C,012	09407	18-26.5GHZ	NOTE 1	

I/O: Initial Only
N/A: Not Applicable
Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

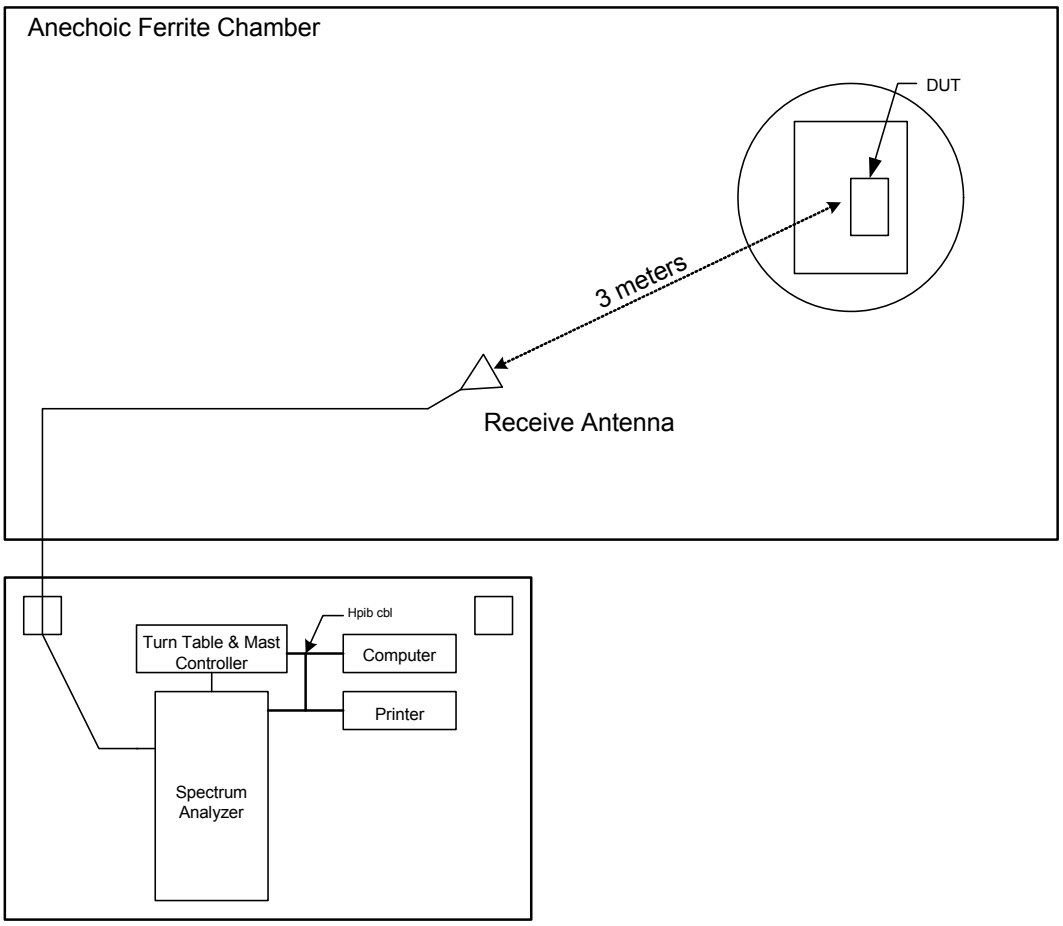


FIGURE 1 BLOCKDIAGRAM OF TEST SETUP

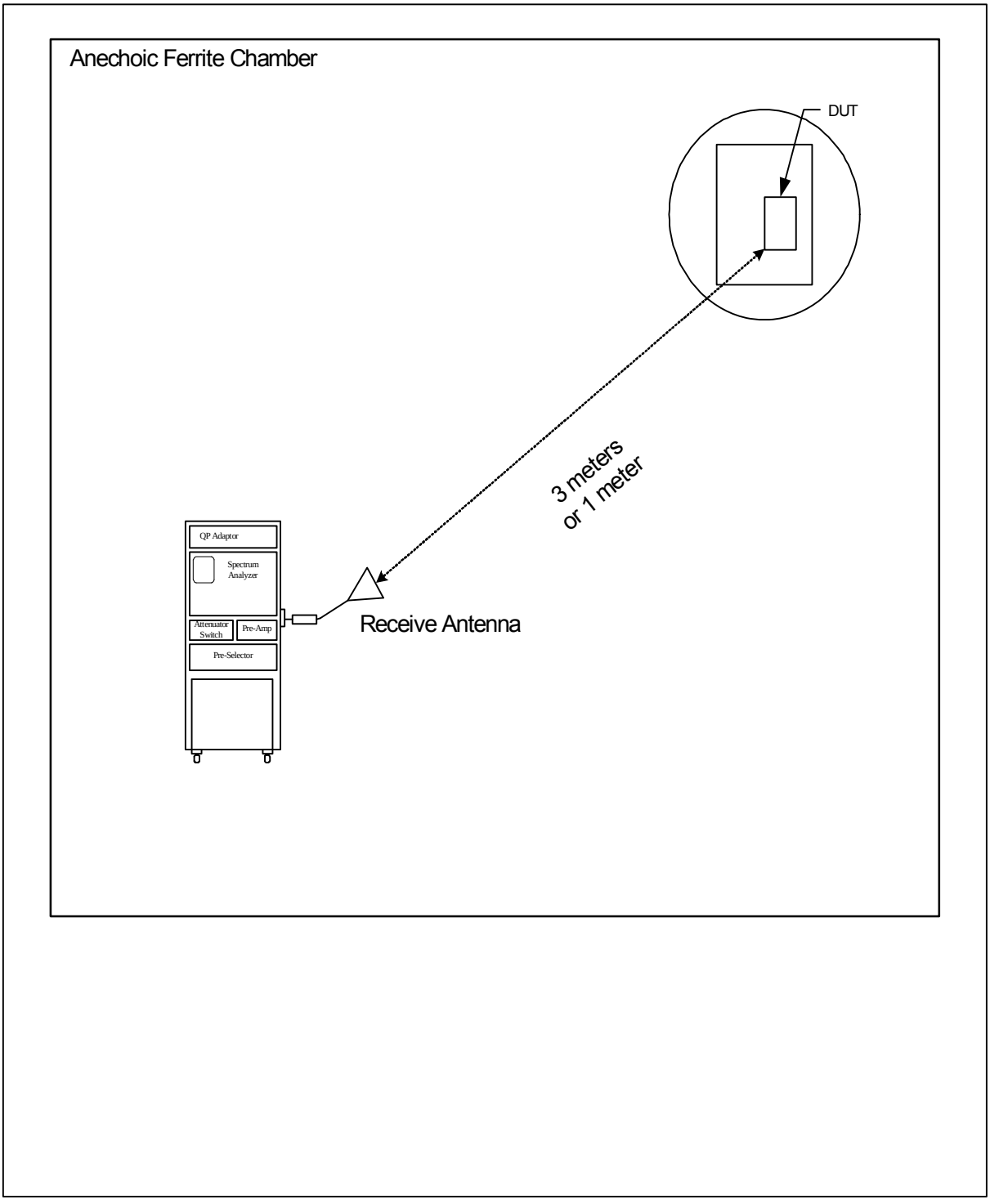
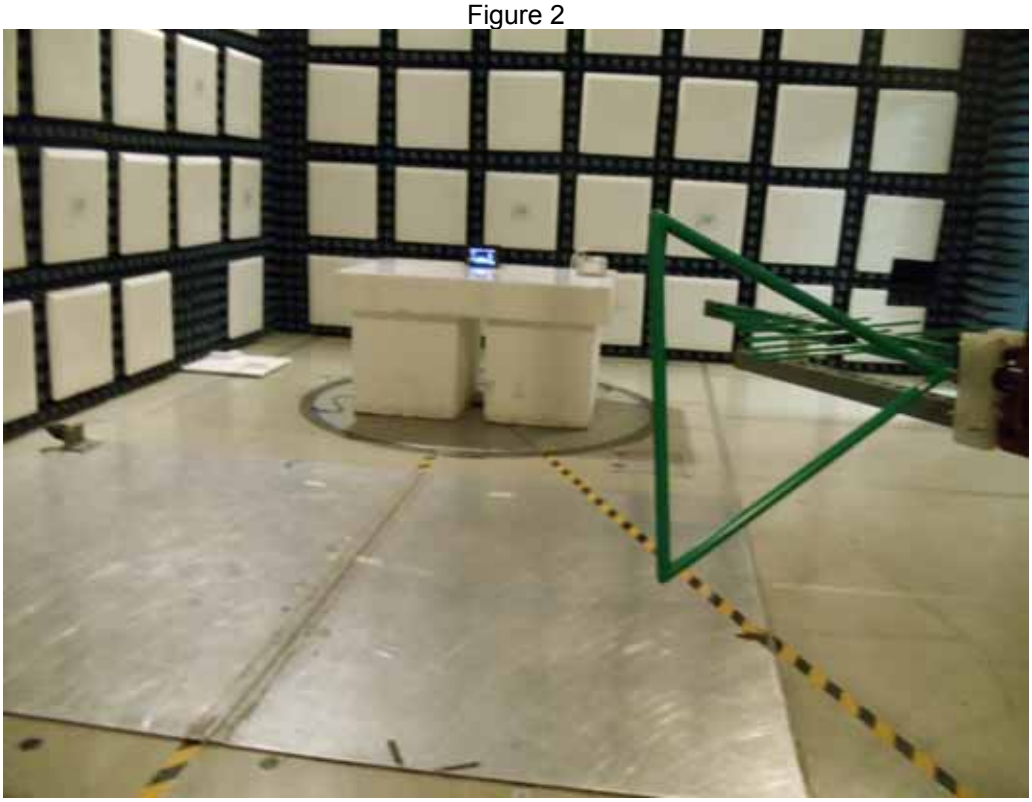

Anechoic Ferrite Chamber
DUT
3 meters
or 1 meter
QP Adaptor
Spectrum
Analyzer
Attenuator
Switch
Pre-Amp
Pre-Selector
Receive Antenna

Figure 2

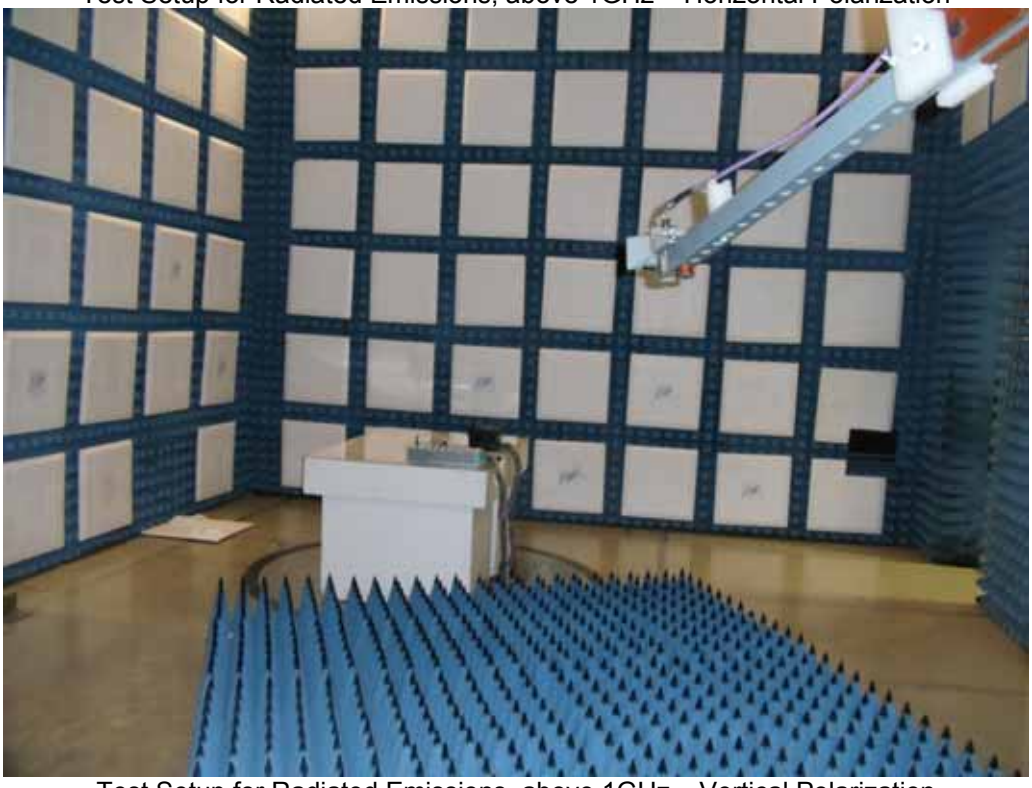


Test Setup for Radiated Emissions, 30MHz to 1GHz – Horizontal Polarization

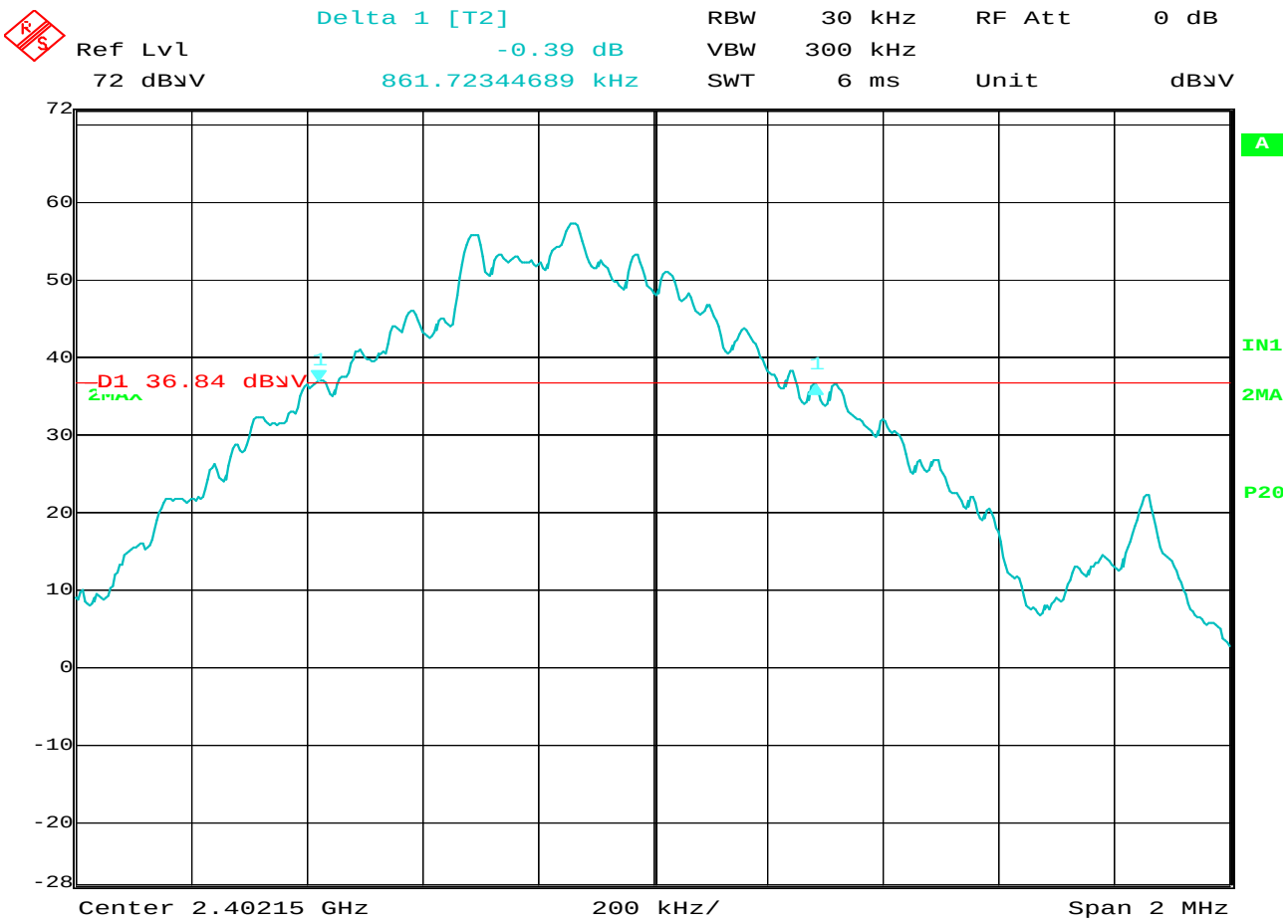
Test Setup for Radiated Emissions, 30MHz to 1GHz – Vertical Polarization

Figure 3

Test Setup for Radiated Emissions, above 1GHz – Horizontal Polarization

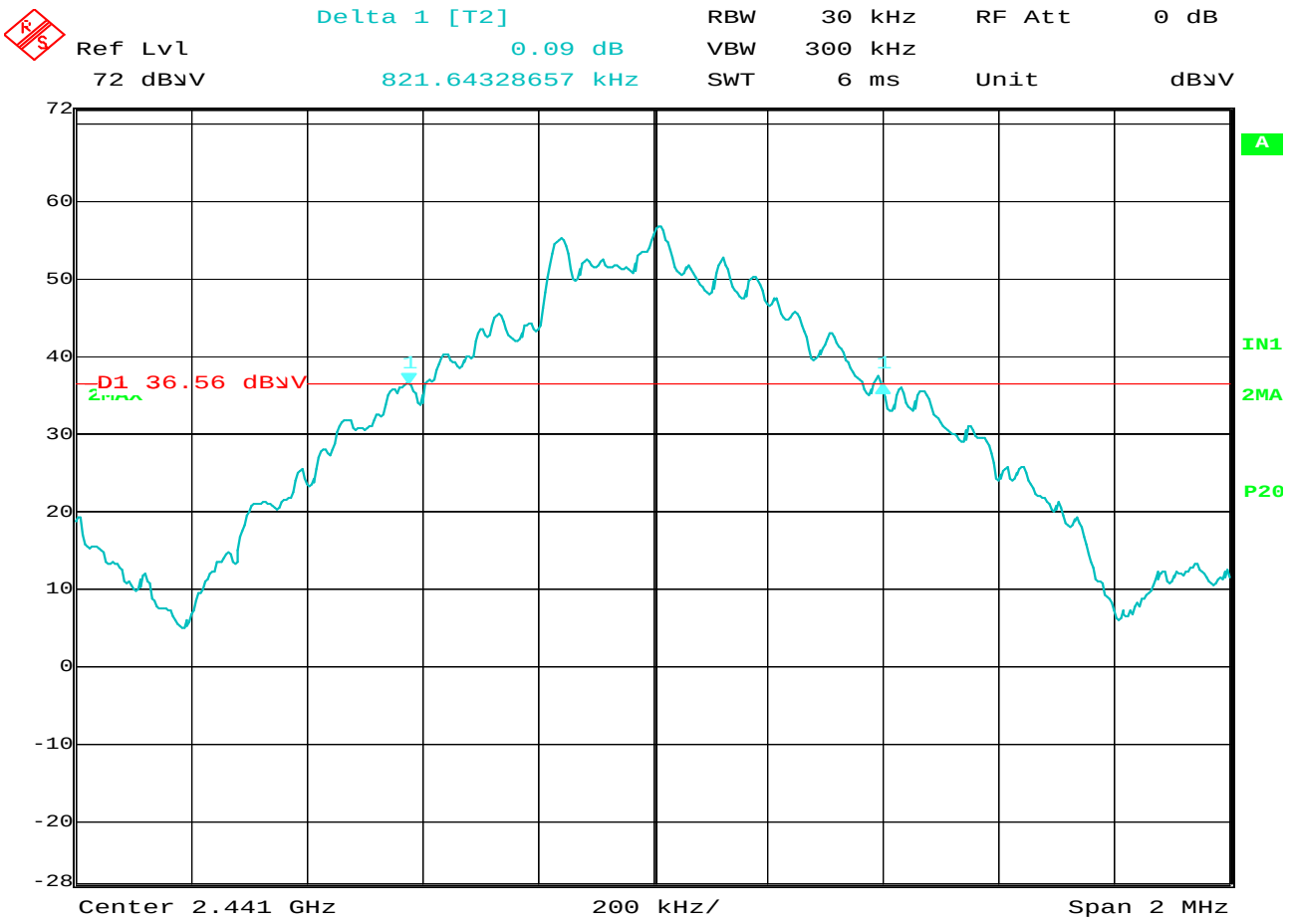


Test Setup for Radiated Emissions, above 1GHz – Vertical Polarization



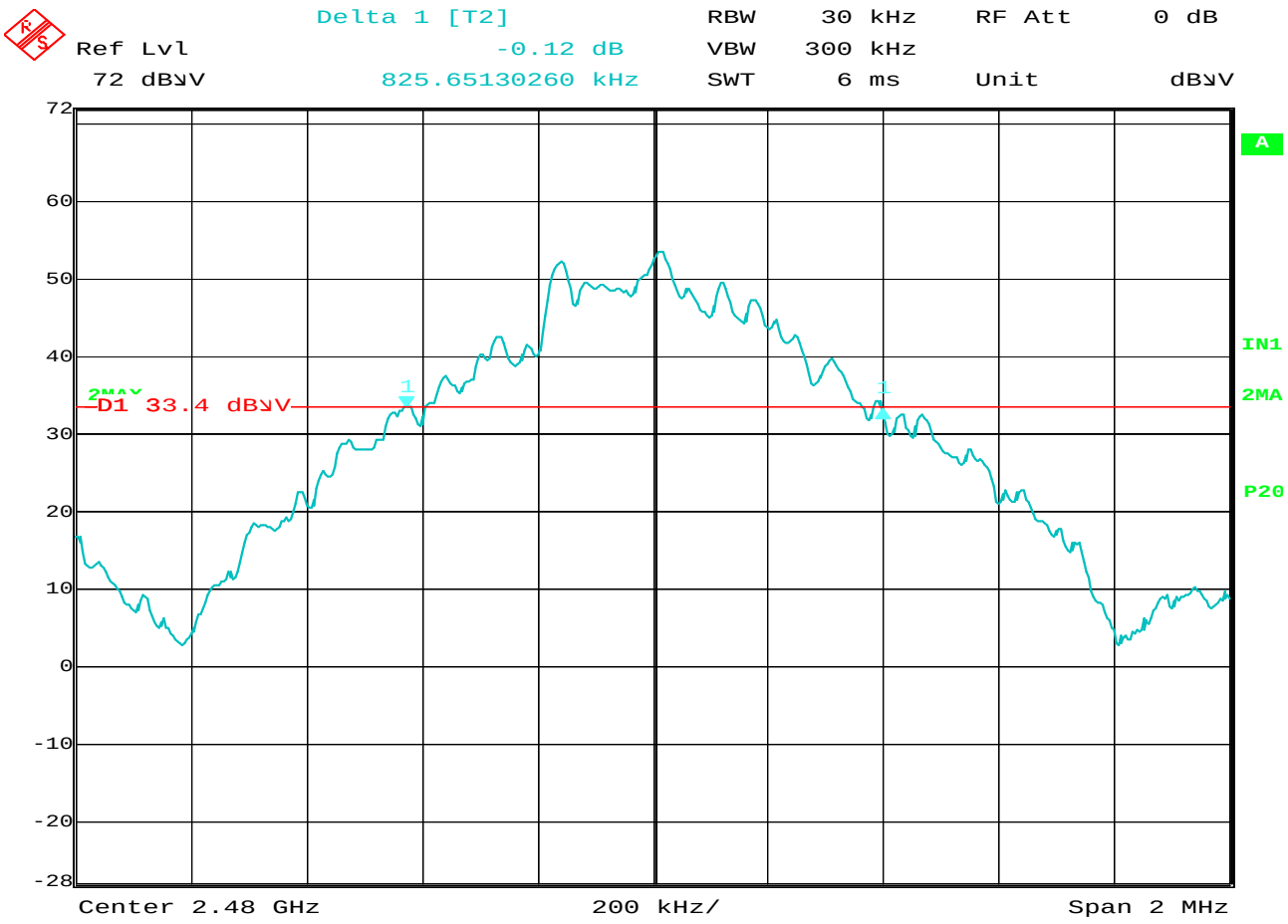
15.247 20 dB Bandwidth

MANUFACTURER : Delphi Electonics and Safety
MODEL NUMBER : 28275847
TEST SPEC. : FCC 15.247
TEST PARAMETERS : 20 dB Bandwidth
EUT FREQUENCY : Tx 2402 MHz
NOTES :



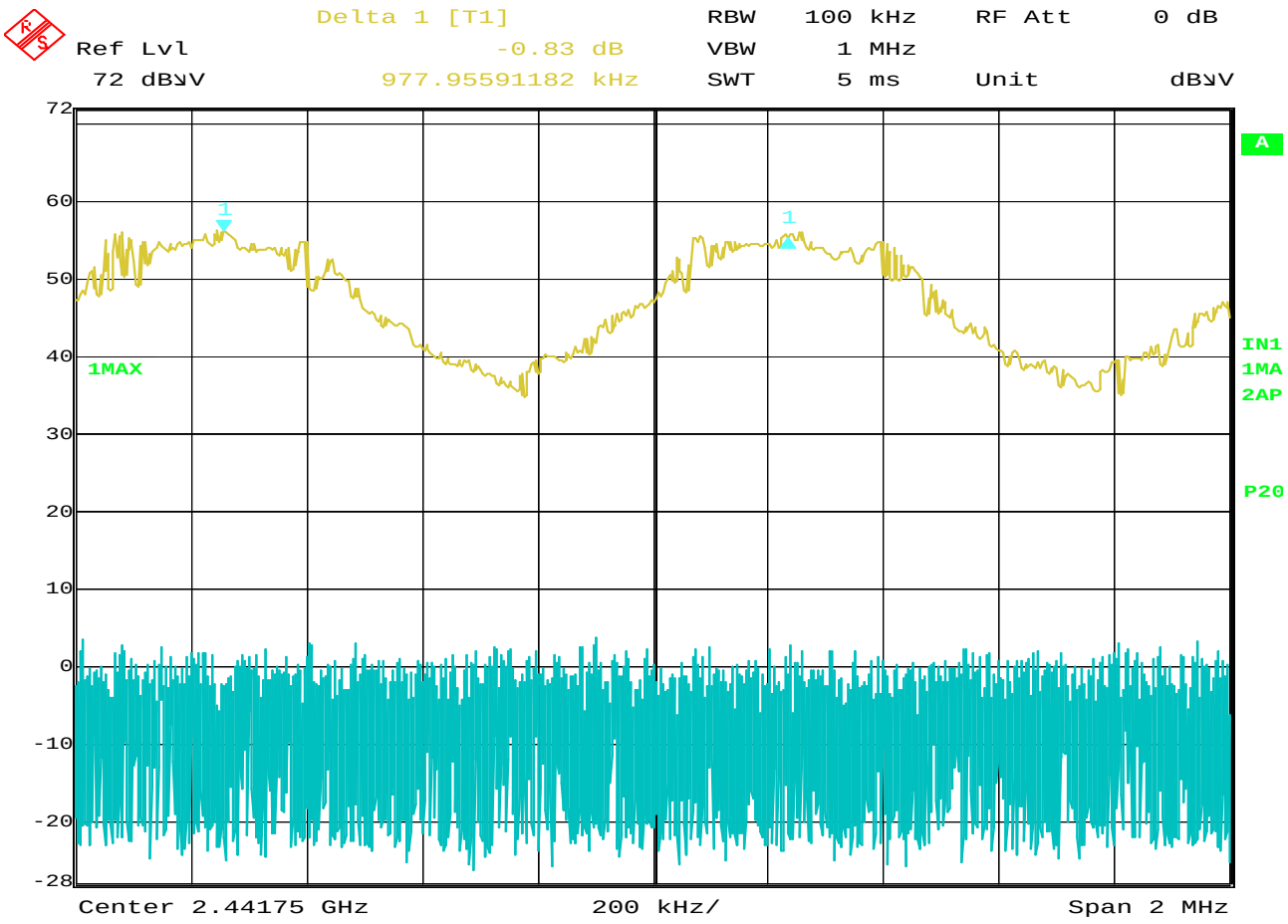
15.247 20 dB Bandwidth

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
TEST PARAMETERS	:	20 dB Bandwidth
EUT FREQUENCY	:	Tx @ 2441MHz
NOTES	:	



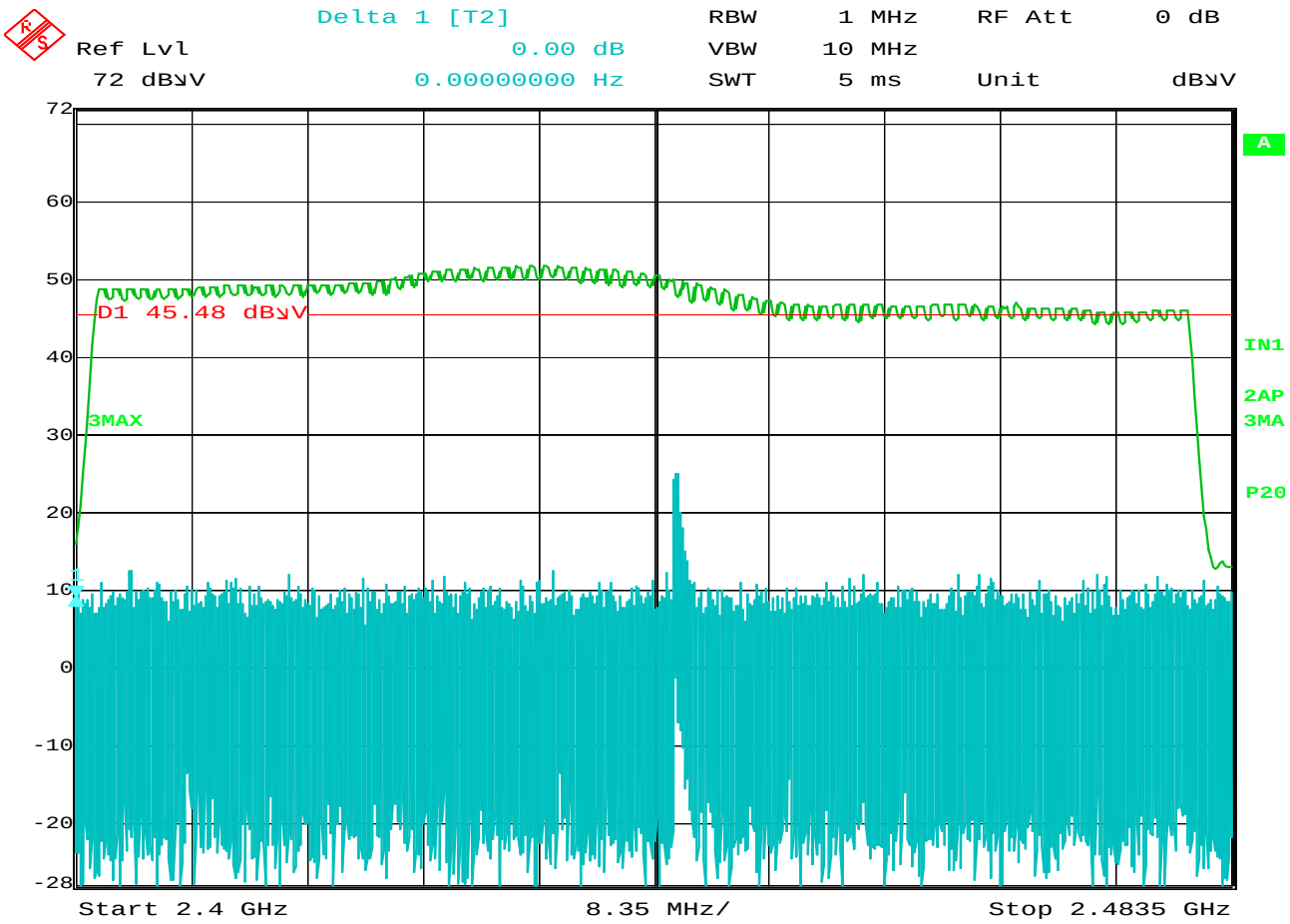
15.247 20 dB Bandwidth

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
TEST PARAMETERS	:	20 dB Bandwidth
EUT FREQUENCY	:	Tx @ 2480MHz
NOTES	:	



15.247 Carrier Frequency Seperation

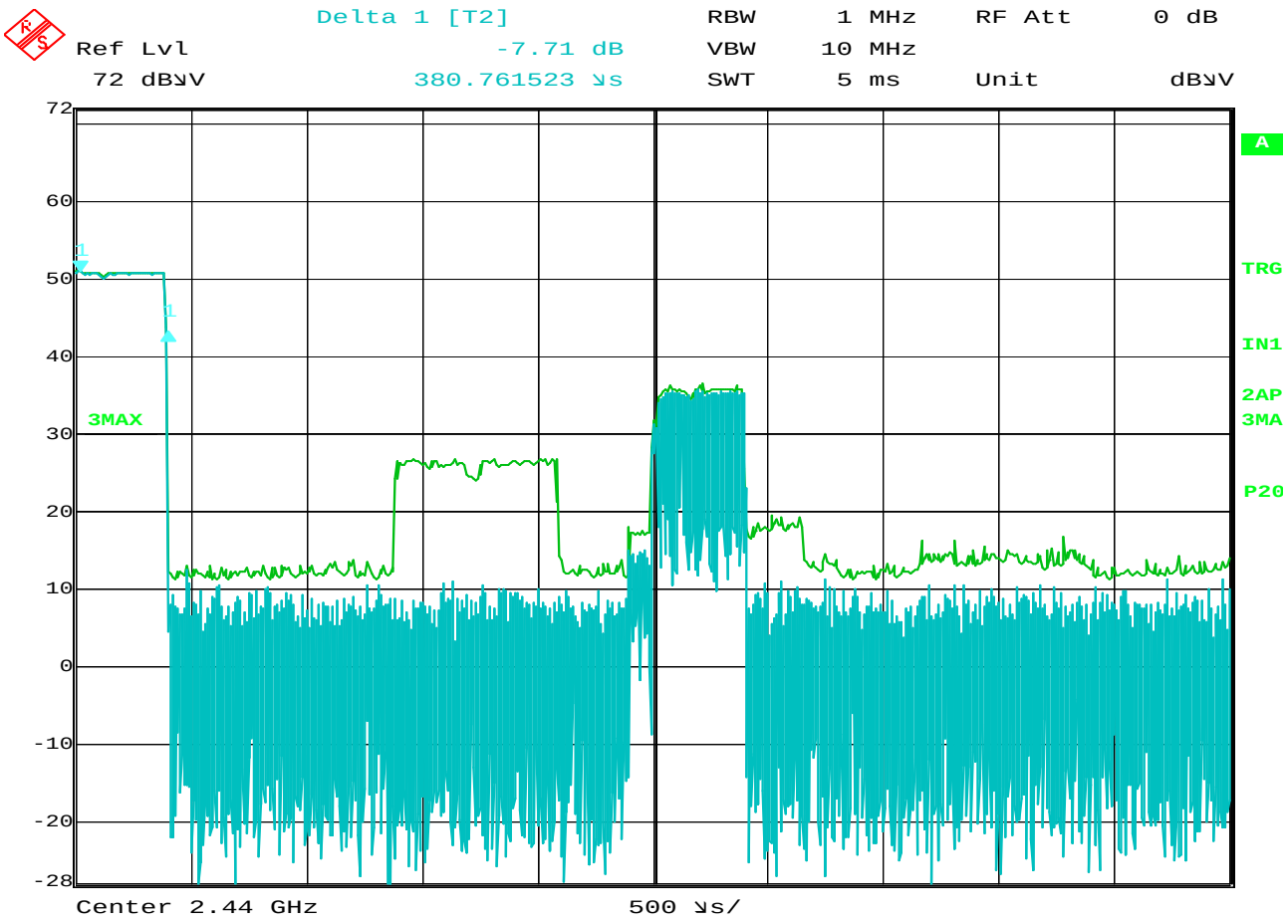
MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	



Date: 7.FEB.2012 11:55:21

15.247 Number of Hopping frequencies

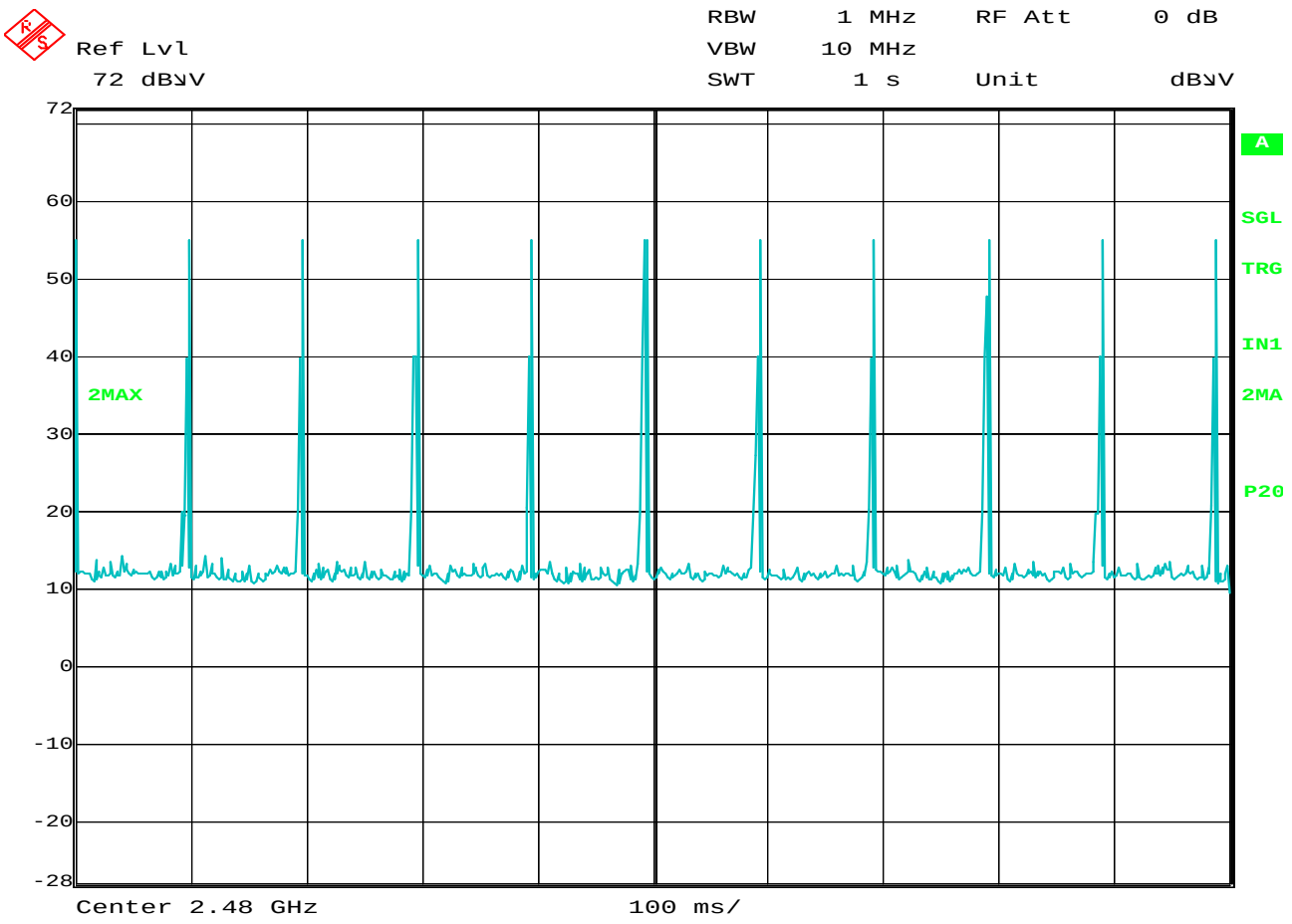
MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	



Date: 7.FEB.2012 11:48:35

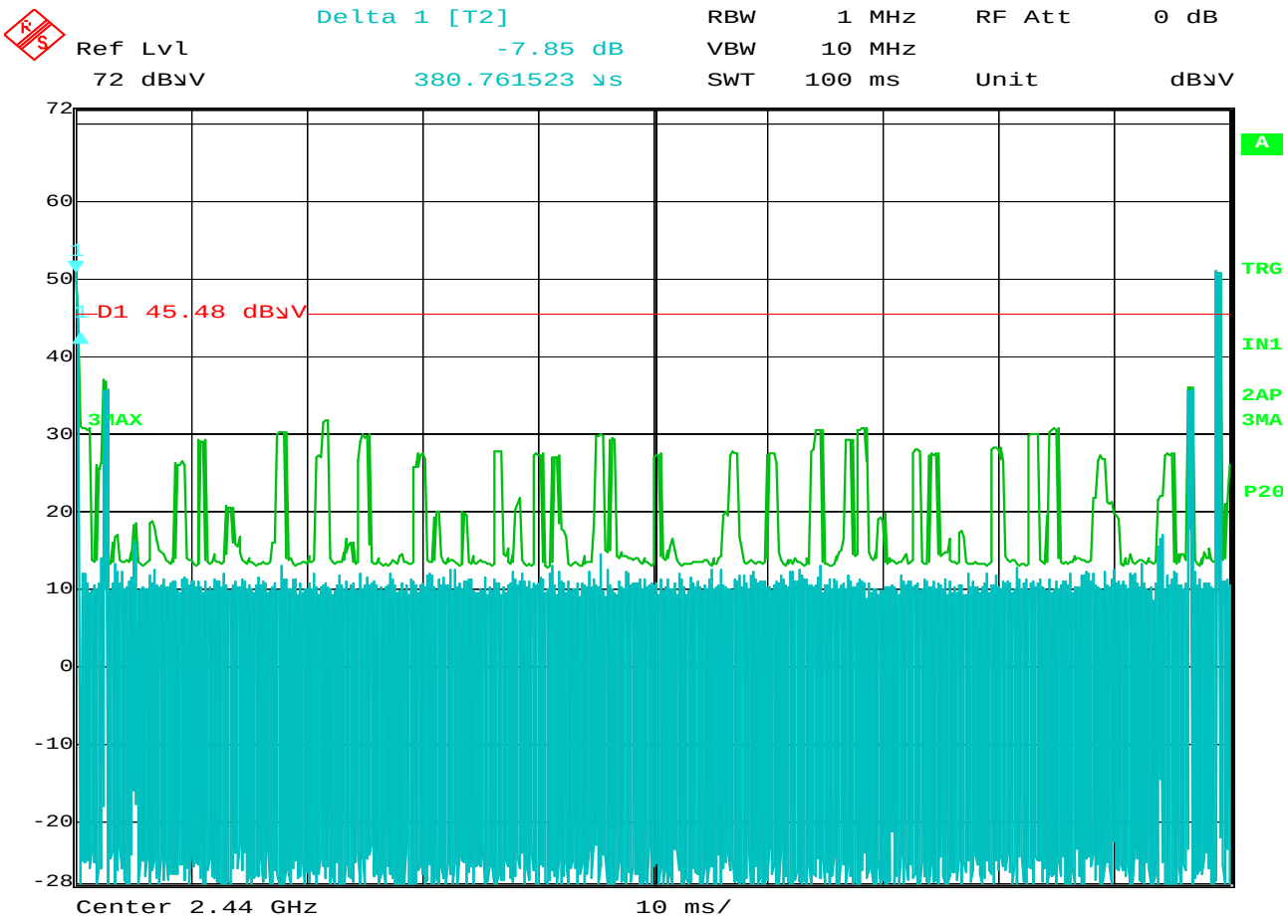
15.247 Time of Occupancy

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	Pulse Width = 380.7 uS



15.247 Time of Occupancy

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	Number of pulses in 1 second = 11.
	:	Number of pulses in 31.6 seconds = 11 times 31.6 = 347.6 hops



15.247 Duty Cycle

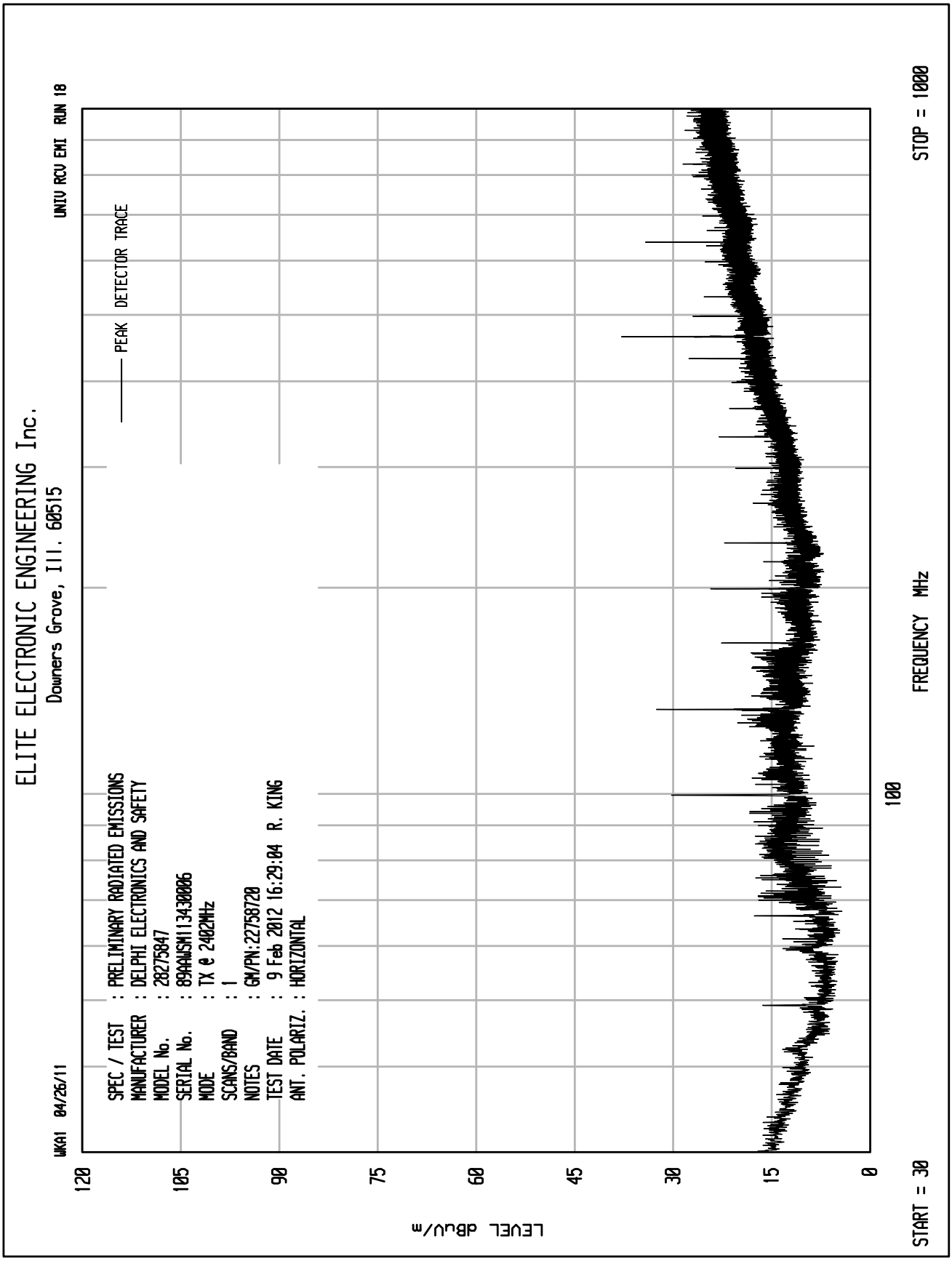
MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	Number of pulses in 100 mS = 2
	:	Duty Cycle Factor = 20*log ((380.7uS*2)/100mS) = -42.36 dB

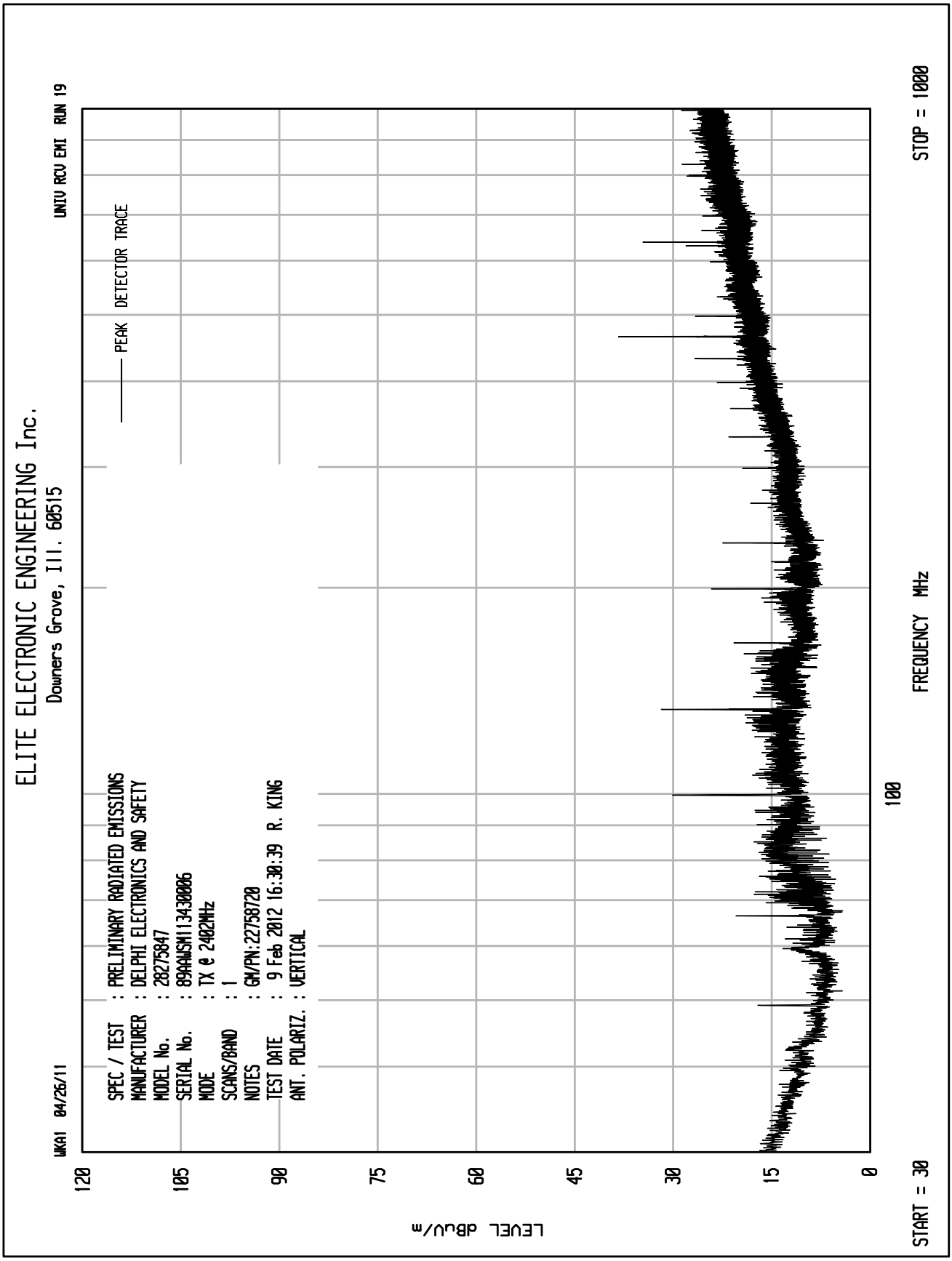
MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : See Below
TEST DATE : Feb, 24, 2012
TEST PARAMETERS : Peak EIRP
NOTES :

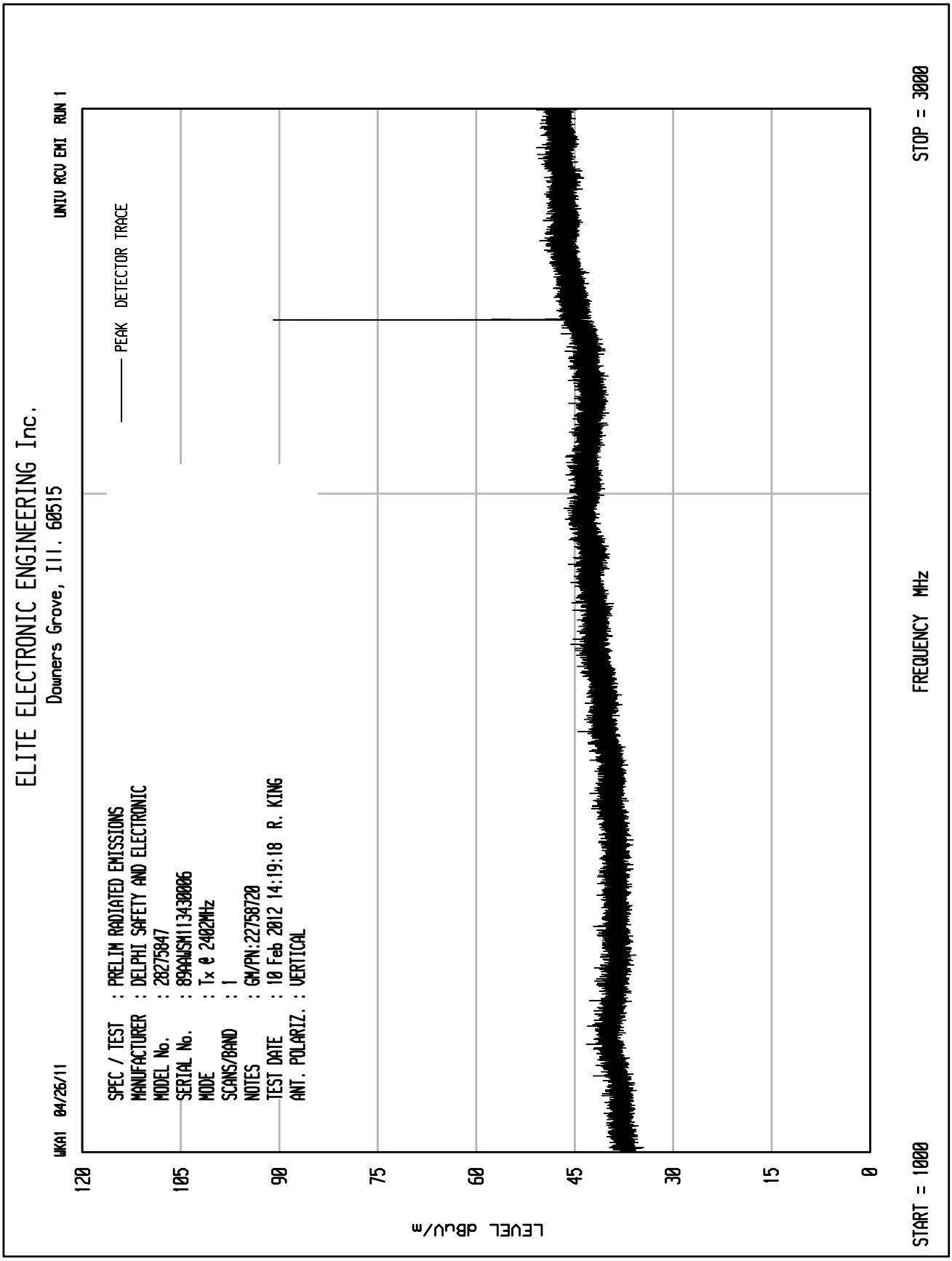
Freq MHz	Ant Pol	Meter Reading dBuV	Matched Signal Generator dB	Ant Gain dB	Cable Factor dB	EIRP Total dBm	Limit dBm
2402.00	H	59.0	-13.7	6.5	2.7	-9.9	36.0
2402.00	V	57.9	-12.6	6.5	2.7	-8.9	36.0
2441.00	H	59.3	-13.3	6.6	2.7	-9.4	36.0
2441.00	V	58.7	-11.7	6.6	2.7	-7.8	36.0
2480.00	H	59.3	-13.2	6.7	2.8	-9.2	36.0
2480.00	V	58.7	-11.4	6.7	2.8	-7.5	36.0

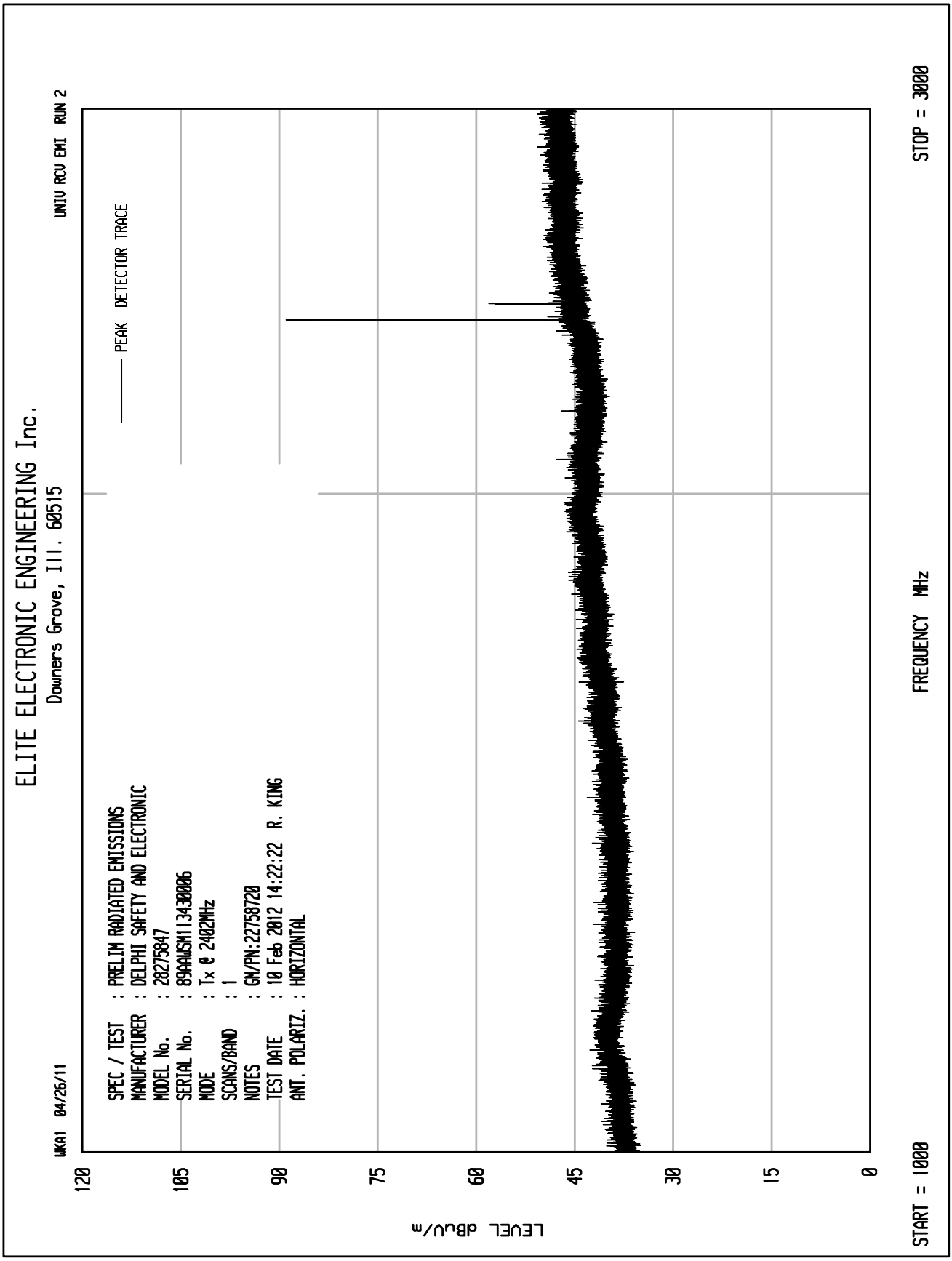
Checked BY Richard E. King :

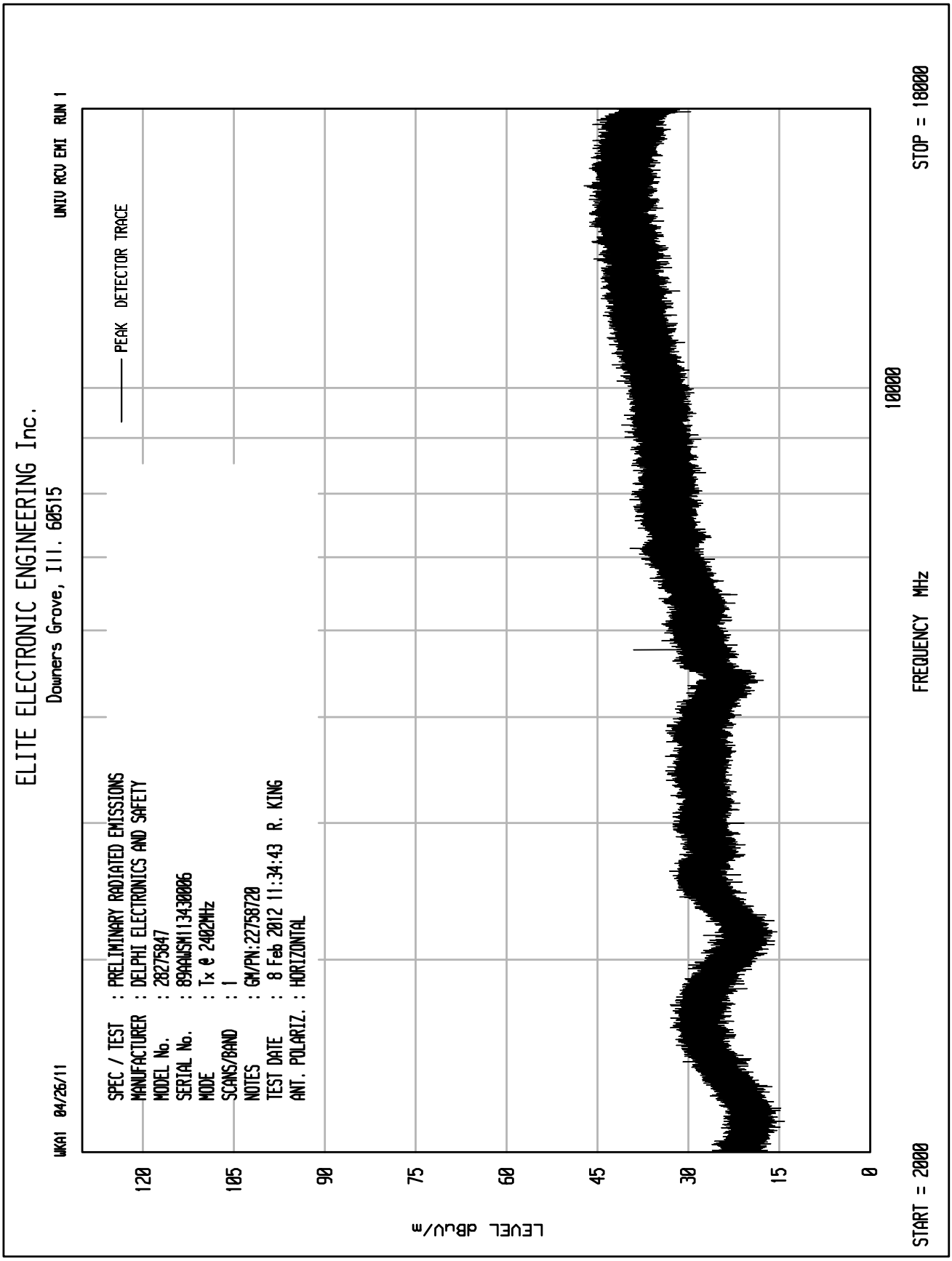
Richard E. King

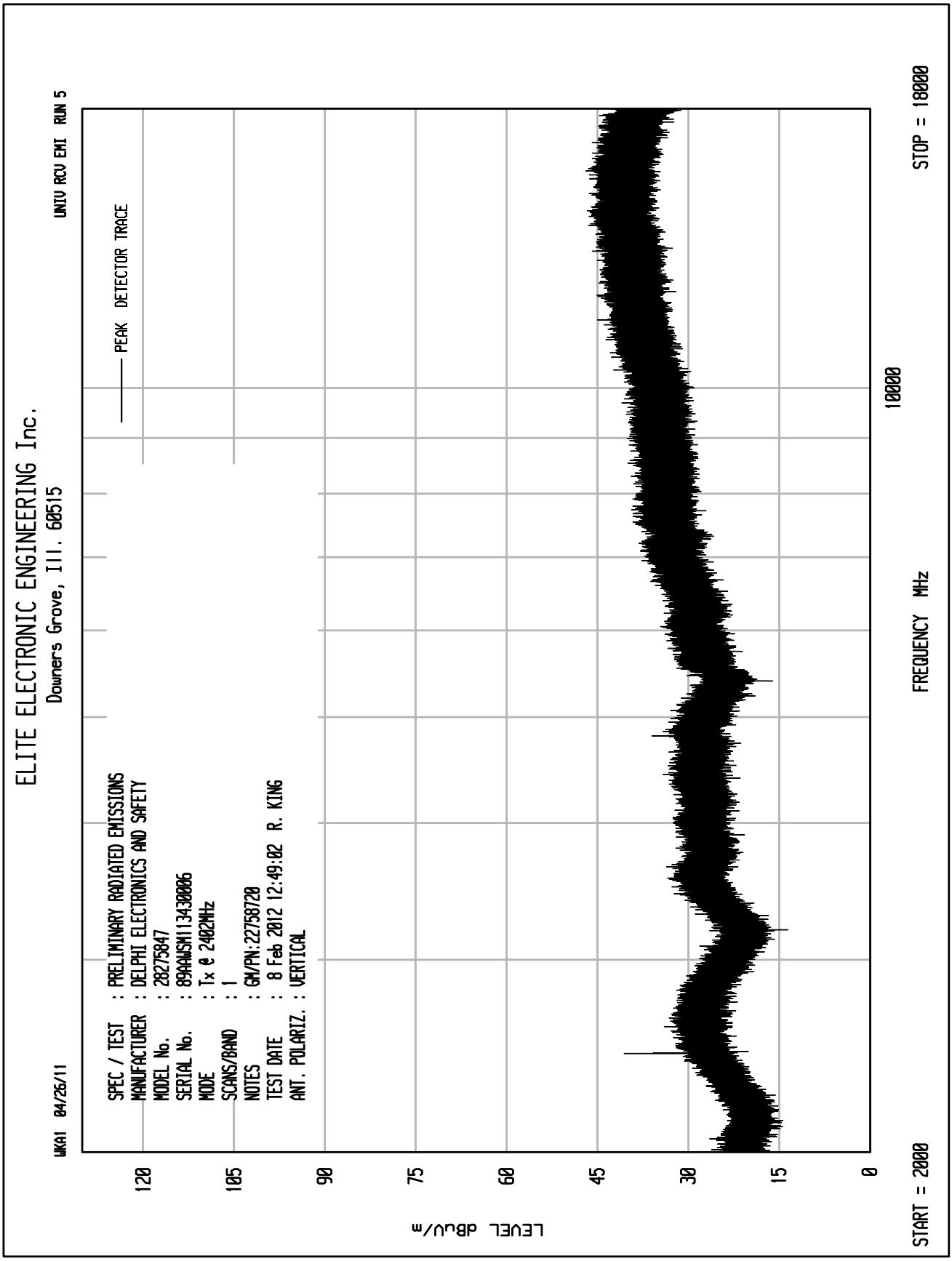

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 18
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : TX @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:29:04 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

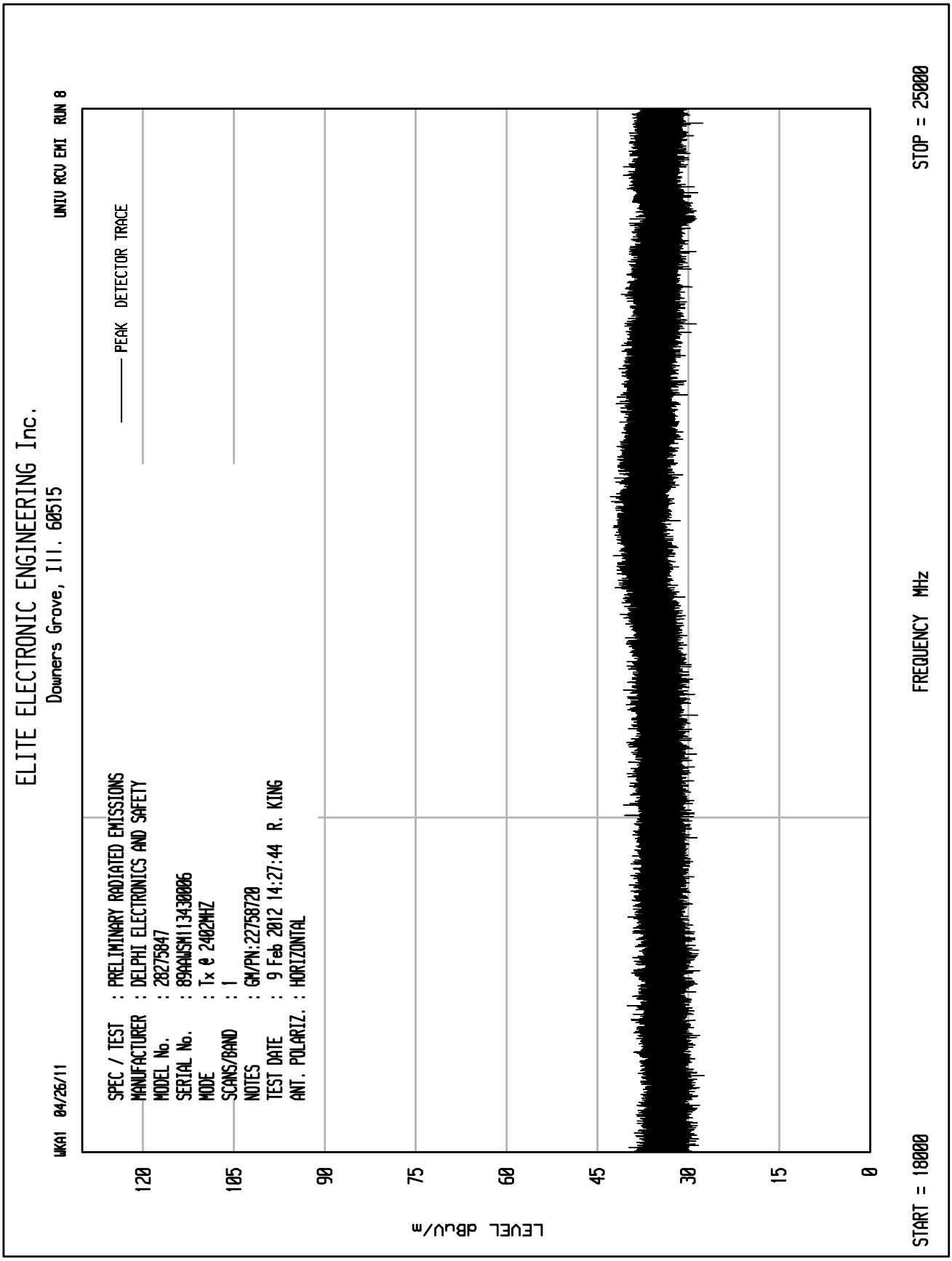

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 19
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300006
MODE : TX @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:30:39 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

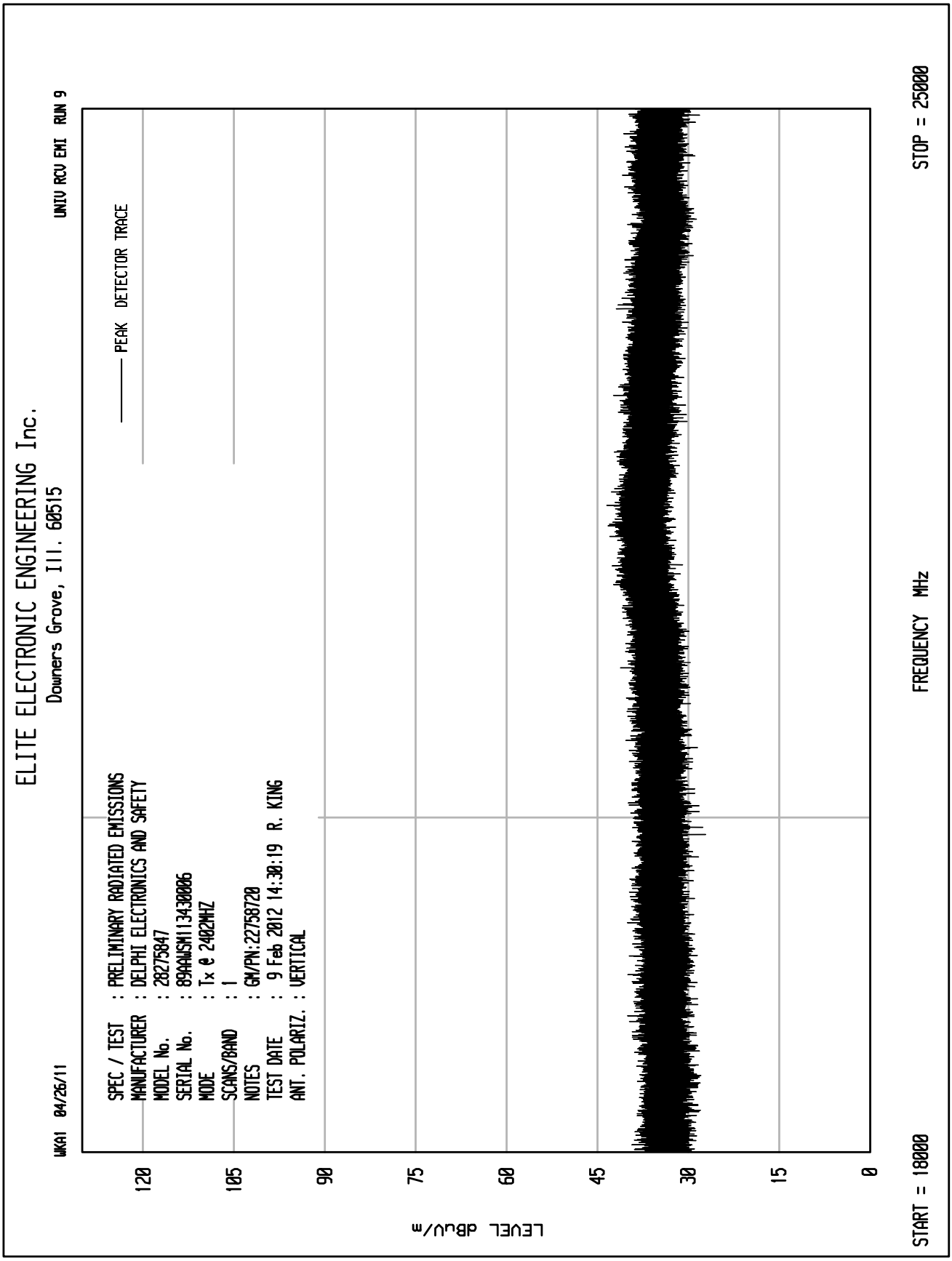

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:19:18 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000

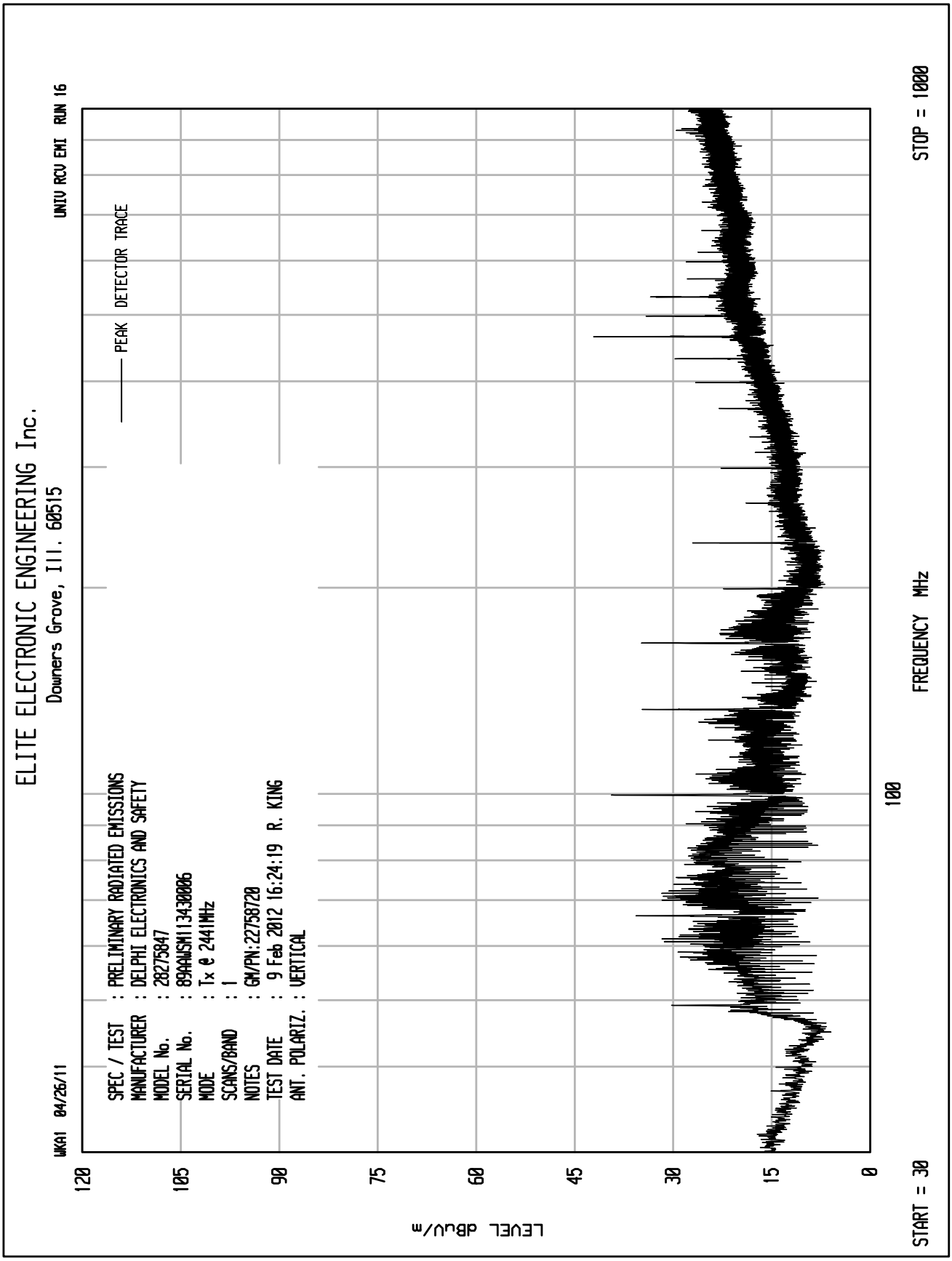

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:22:22 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000

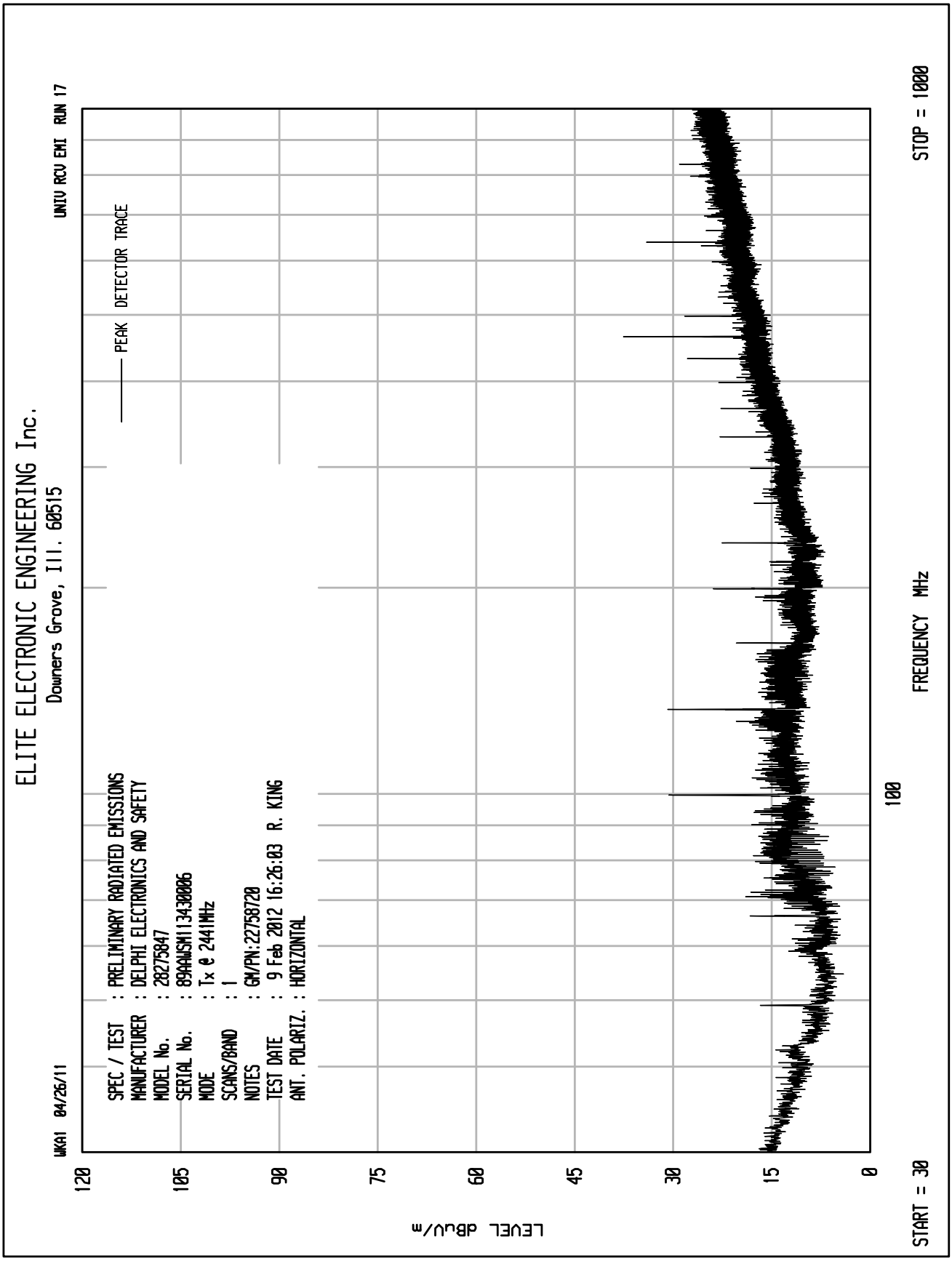

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 8 Feb 2012 11:34:43 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
FREQUENCY MHz
STOP = 18000

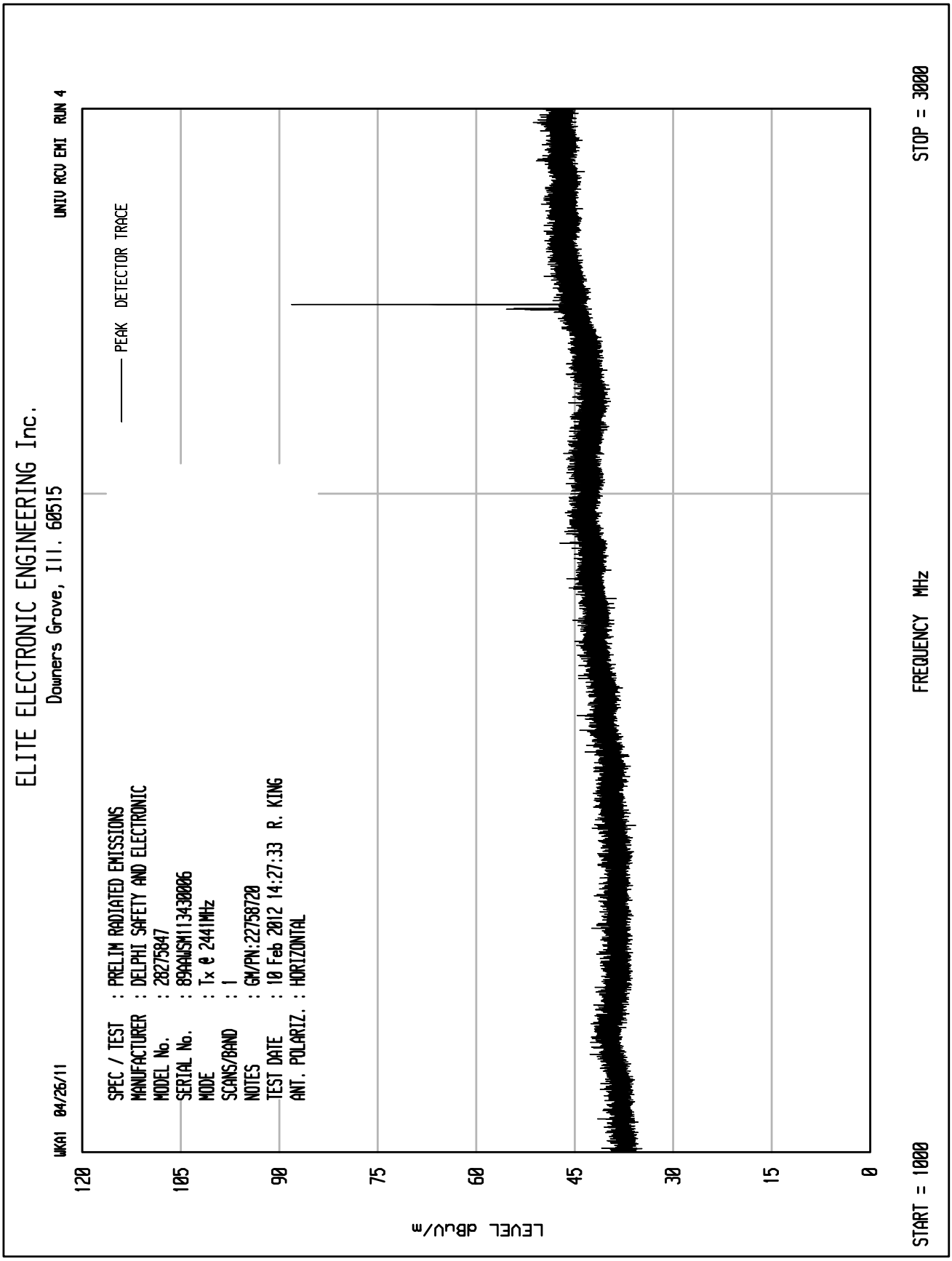

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2402MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 8 Feb 2012 12:49:02 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz

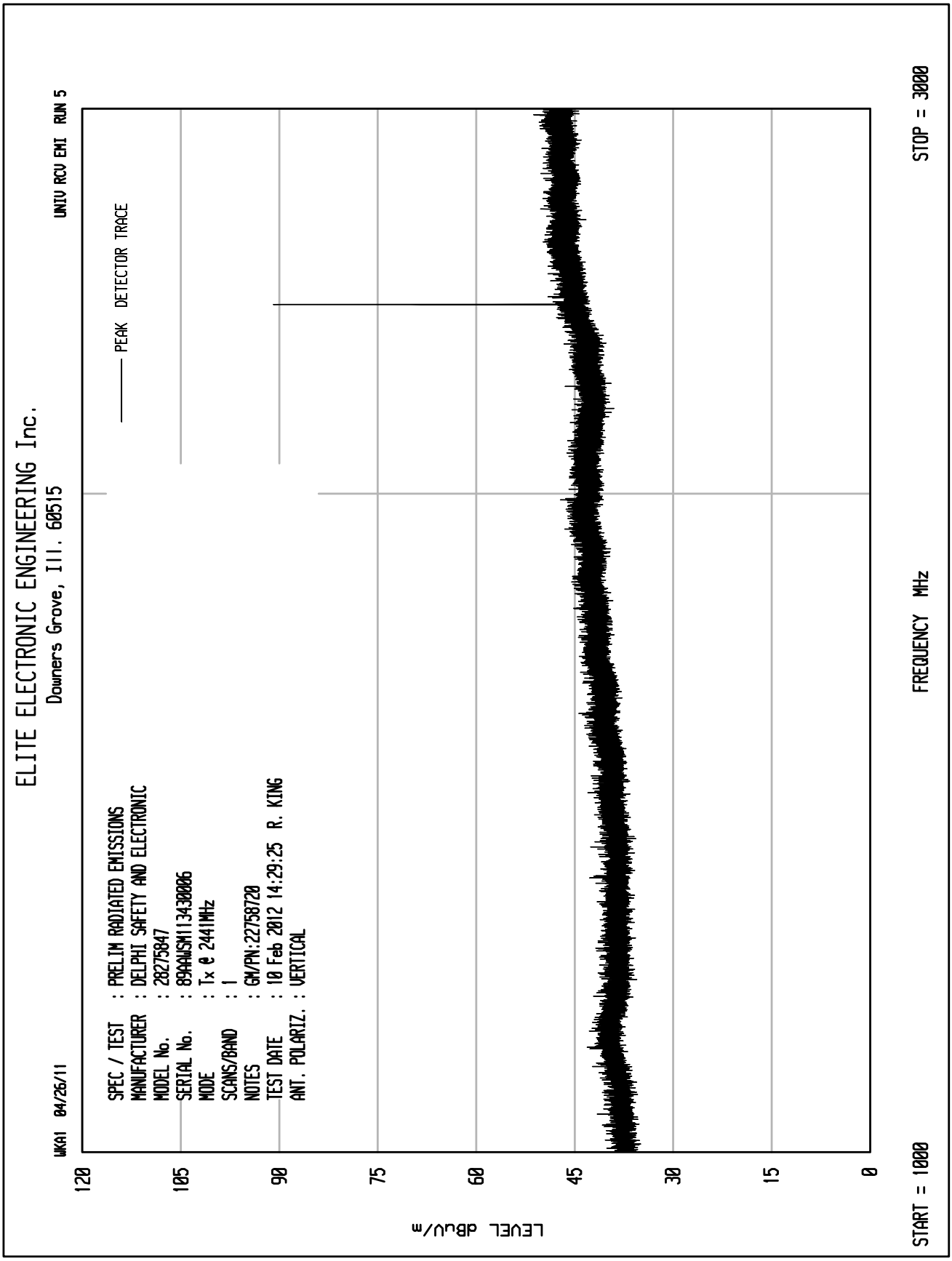

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 8
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2402MHZ
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:27:44 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

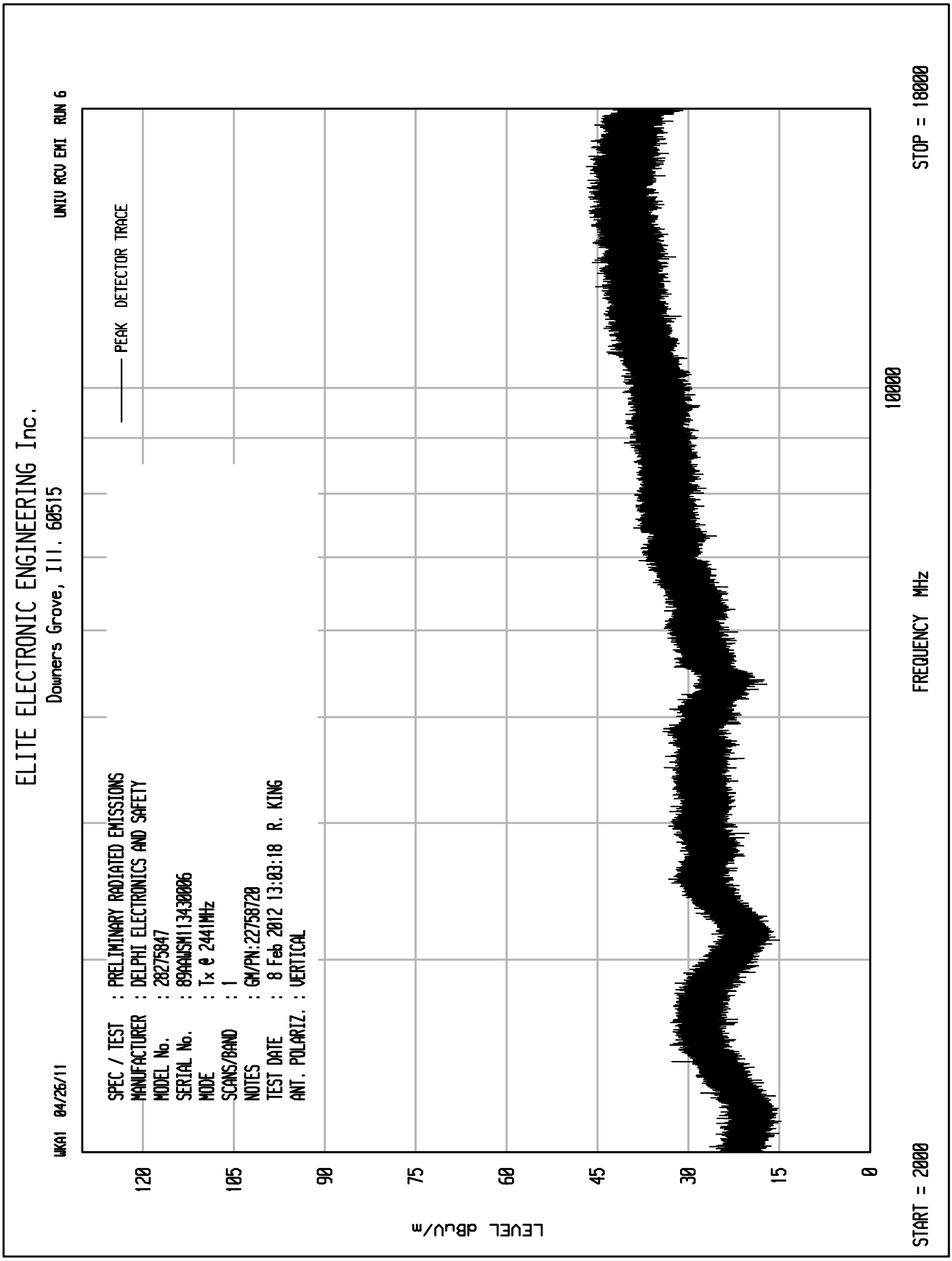

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 9
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300006
MODE : Tx @ 2402MHZ
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:30:19 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

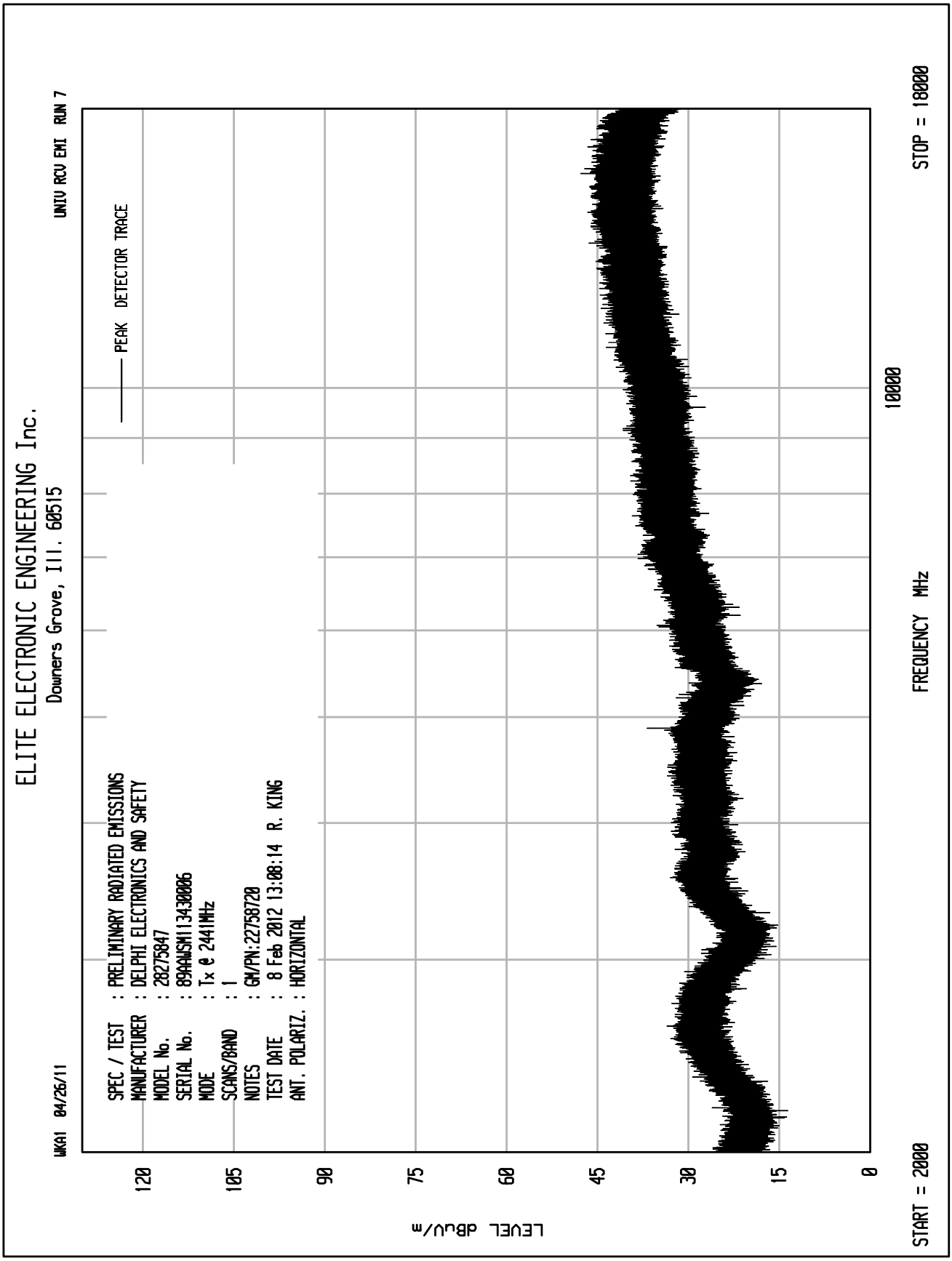

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 16
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:24:19 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

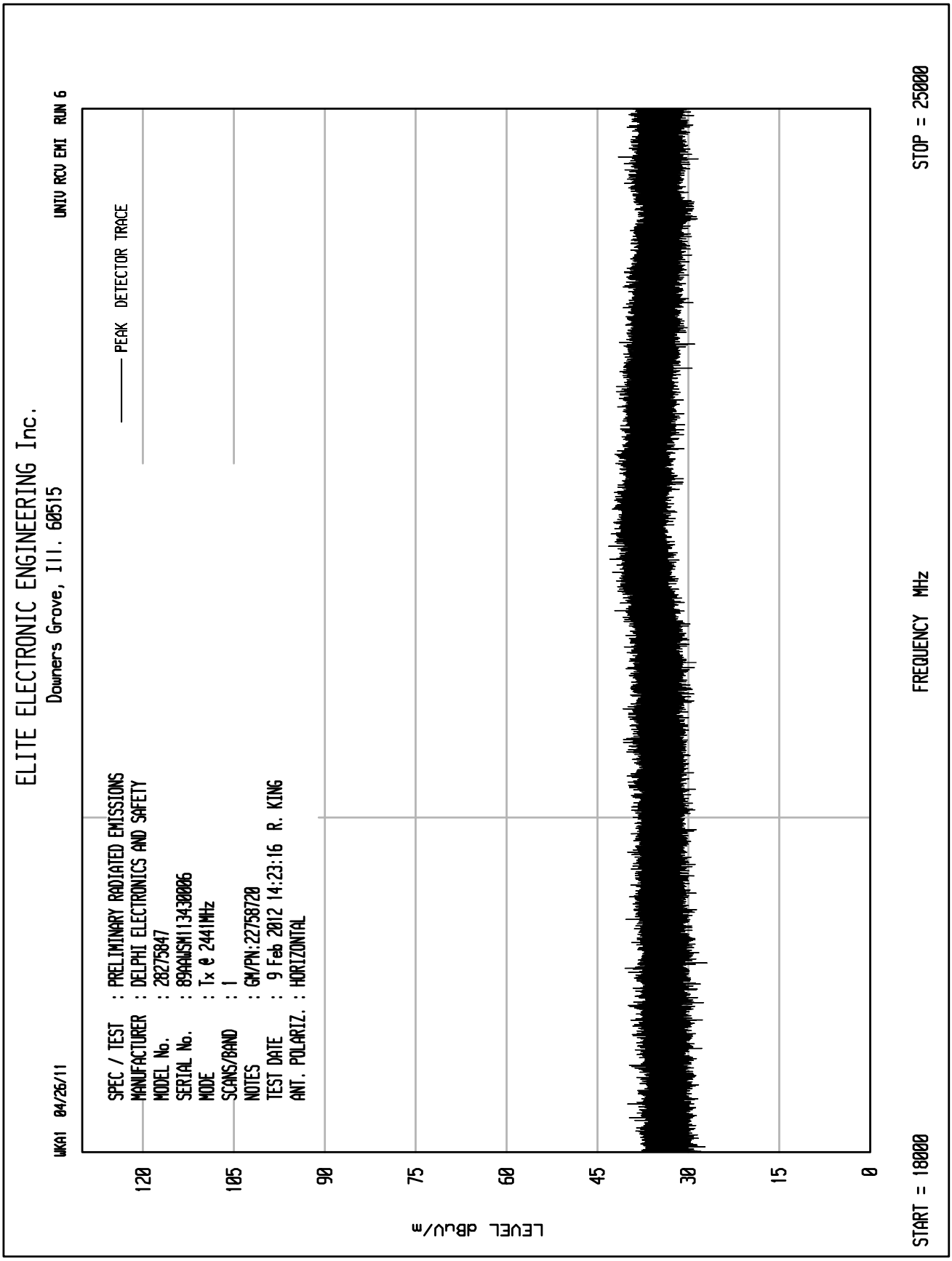

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 17
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:26:03 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

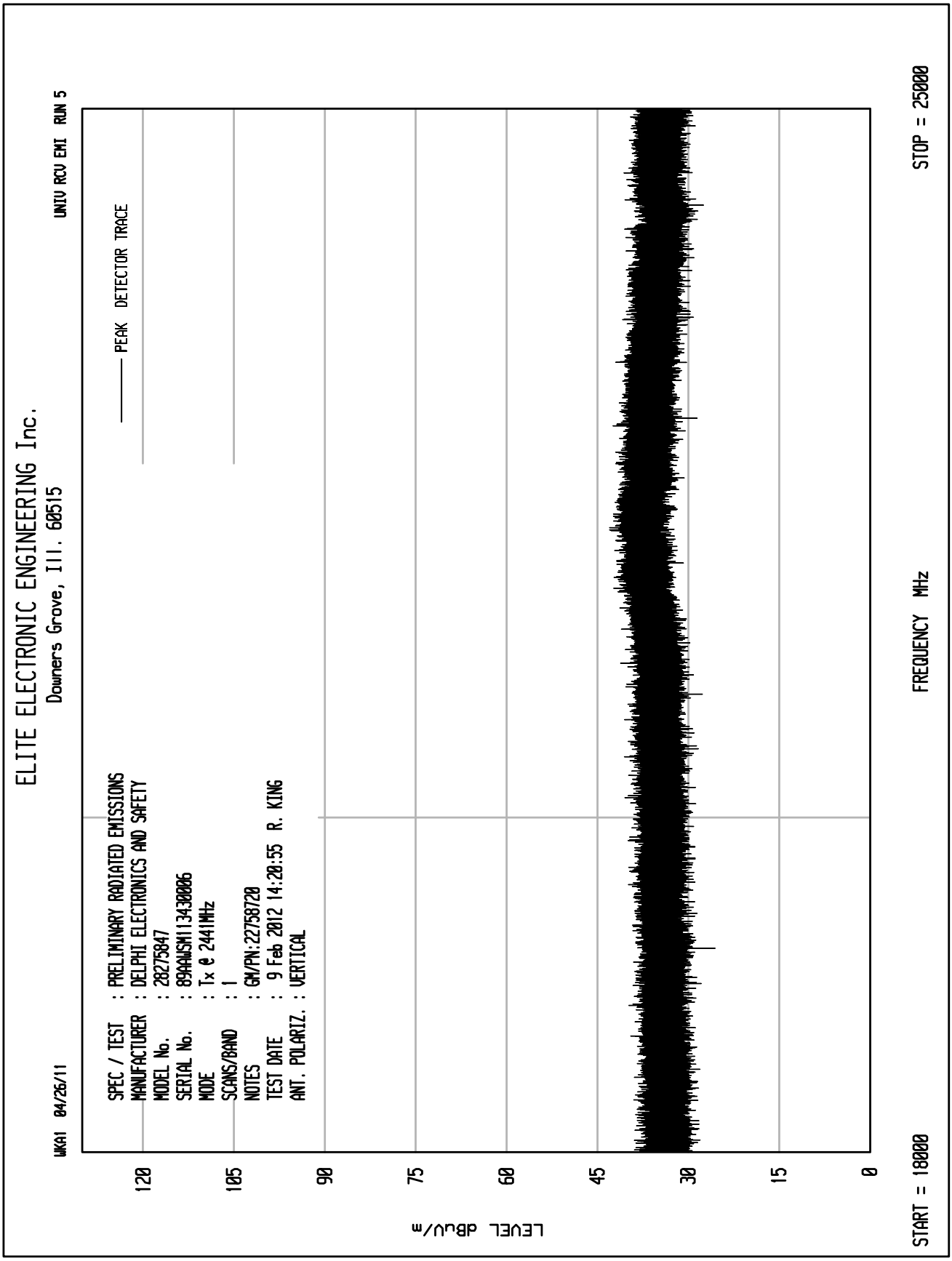

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 4
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:27:33 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000

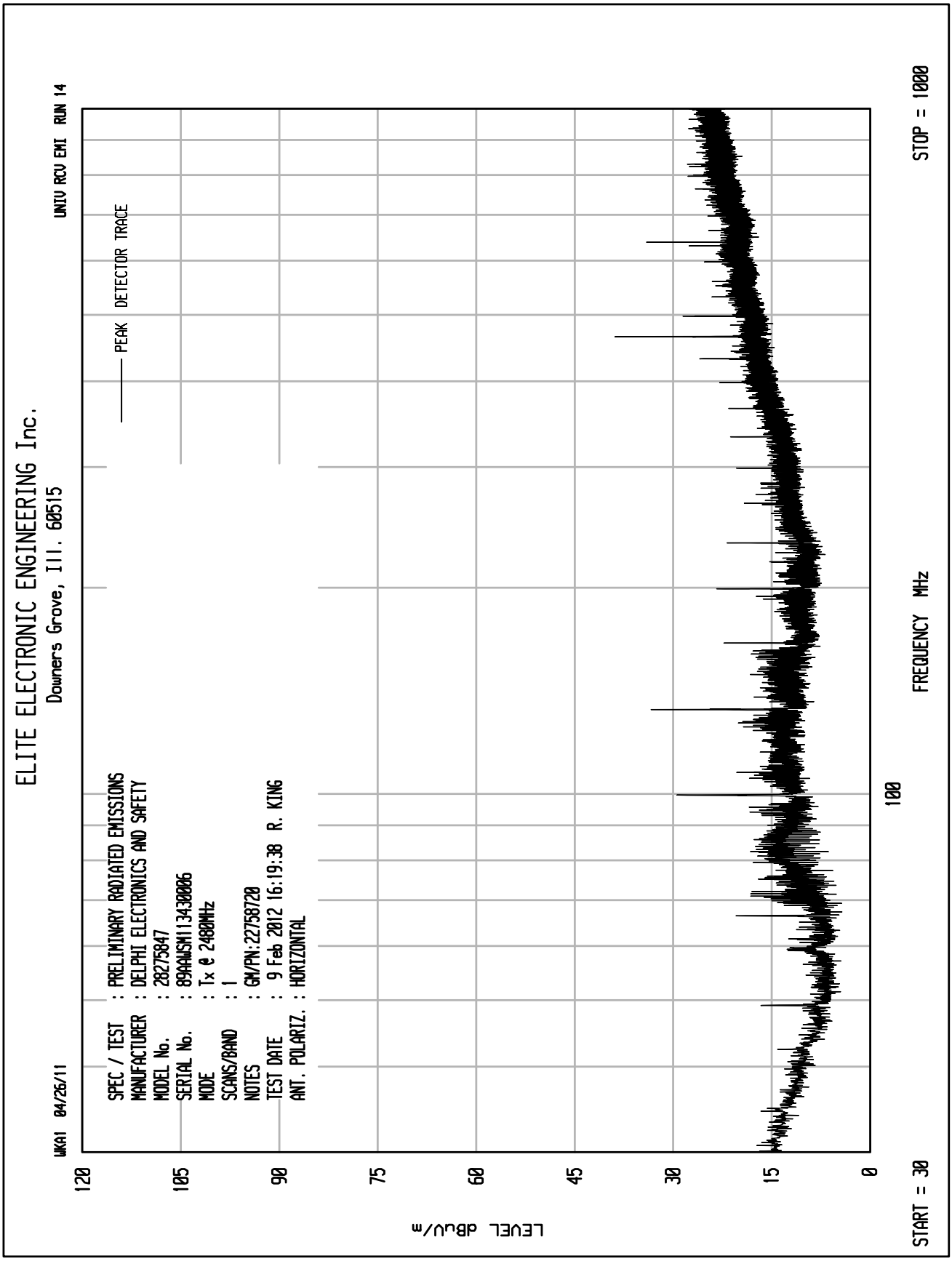

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:29:25 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000

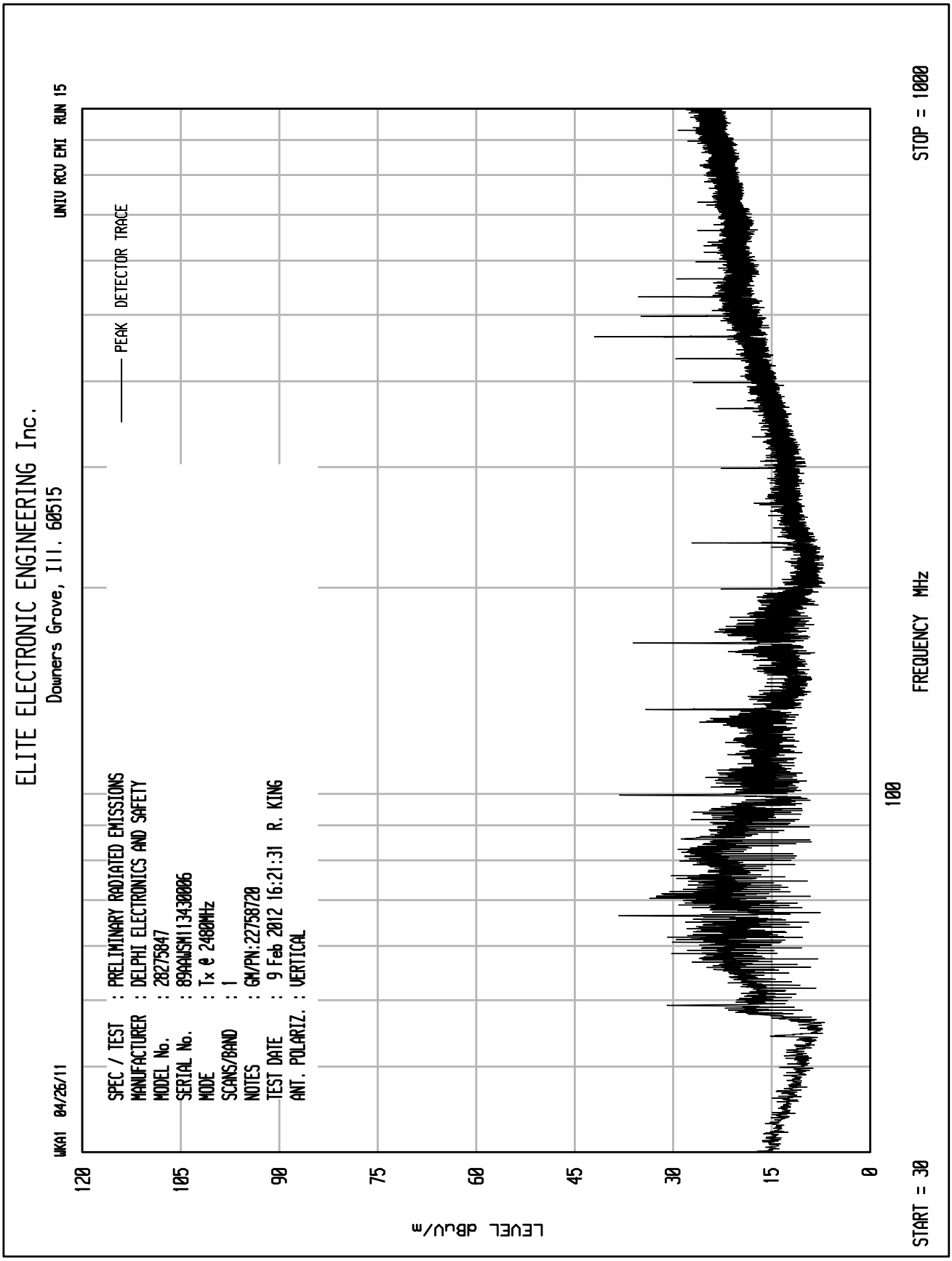

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 8 Feb 2012 13:03:18 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz

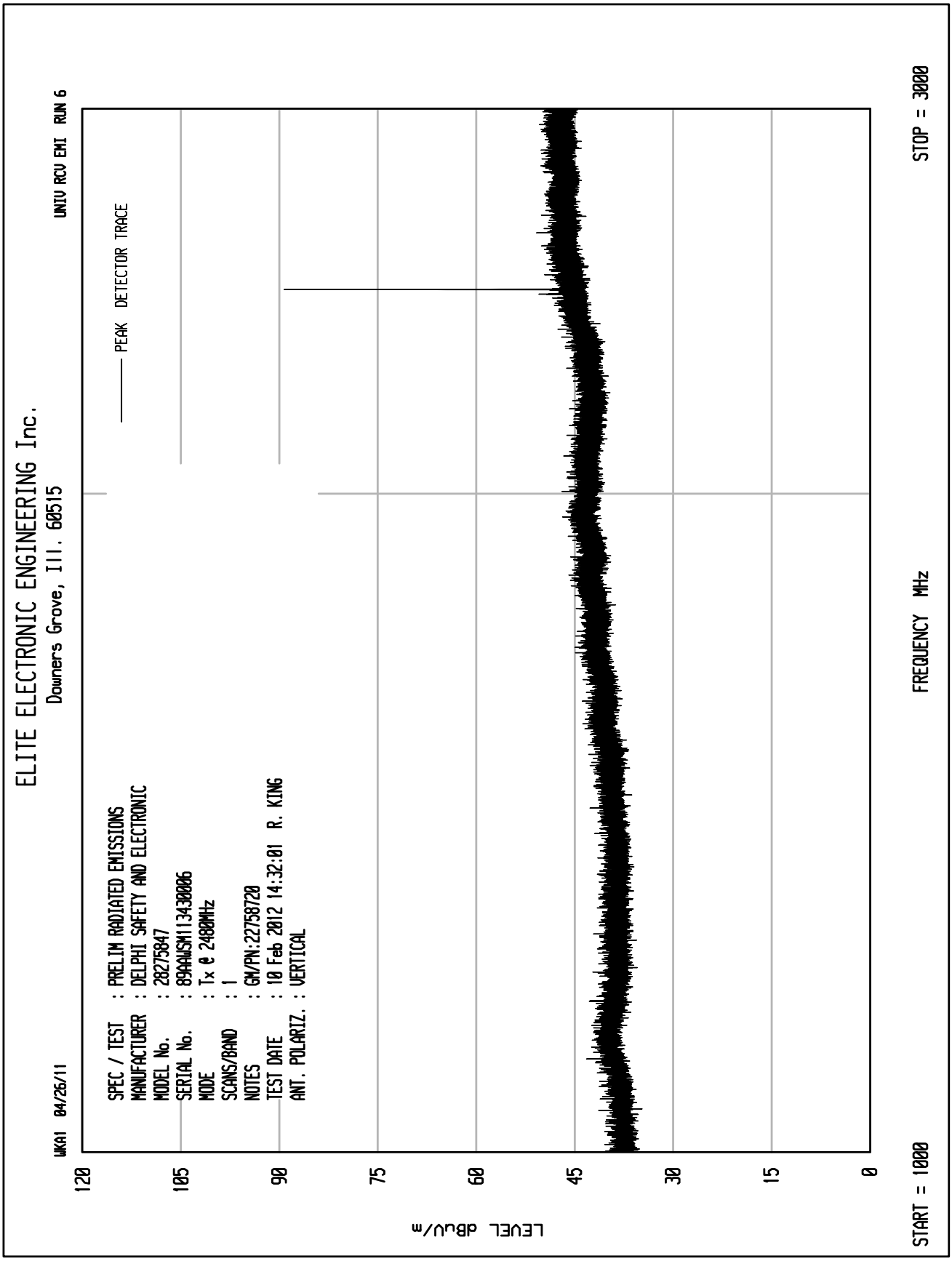

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 8 Feb 2012 13:08:14 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz

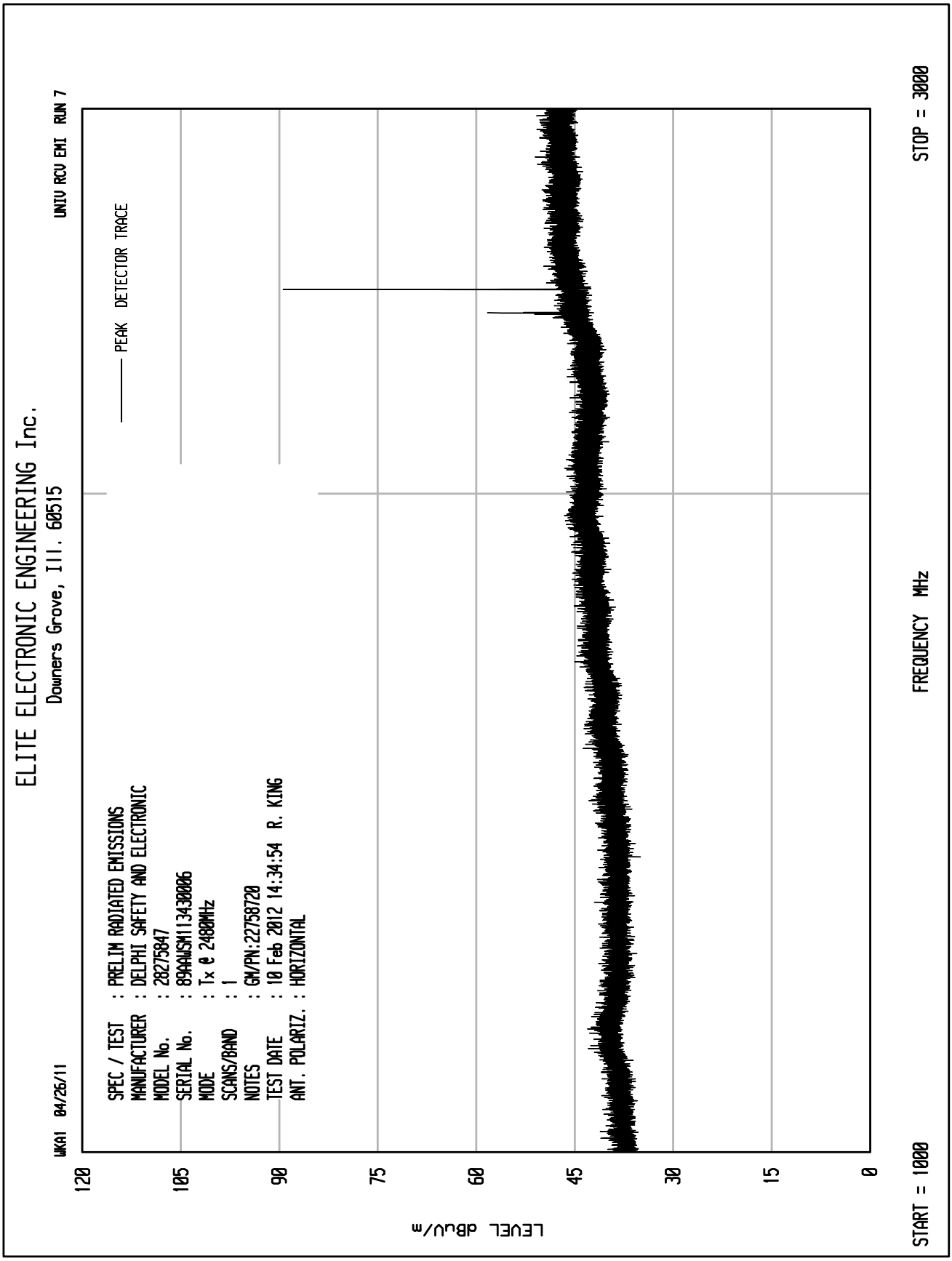

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 894AWSM1134300006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:23:16 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

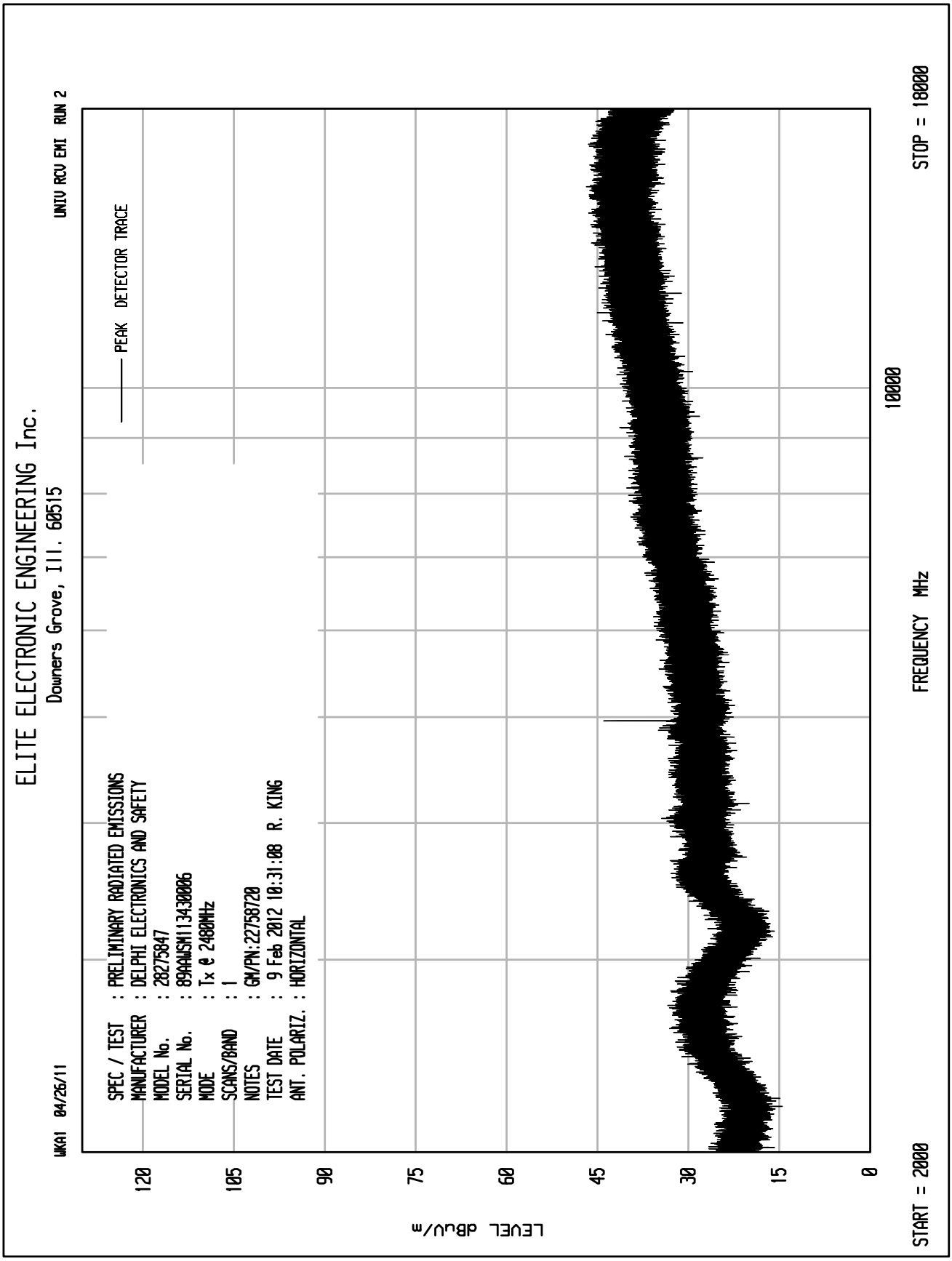

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 5
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 894AWSM113430006
MODE : Tx @ 2441MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:20:55 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

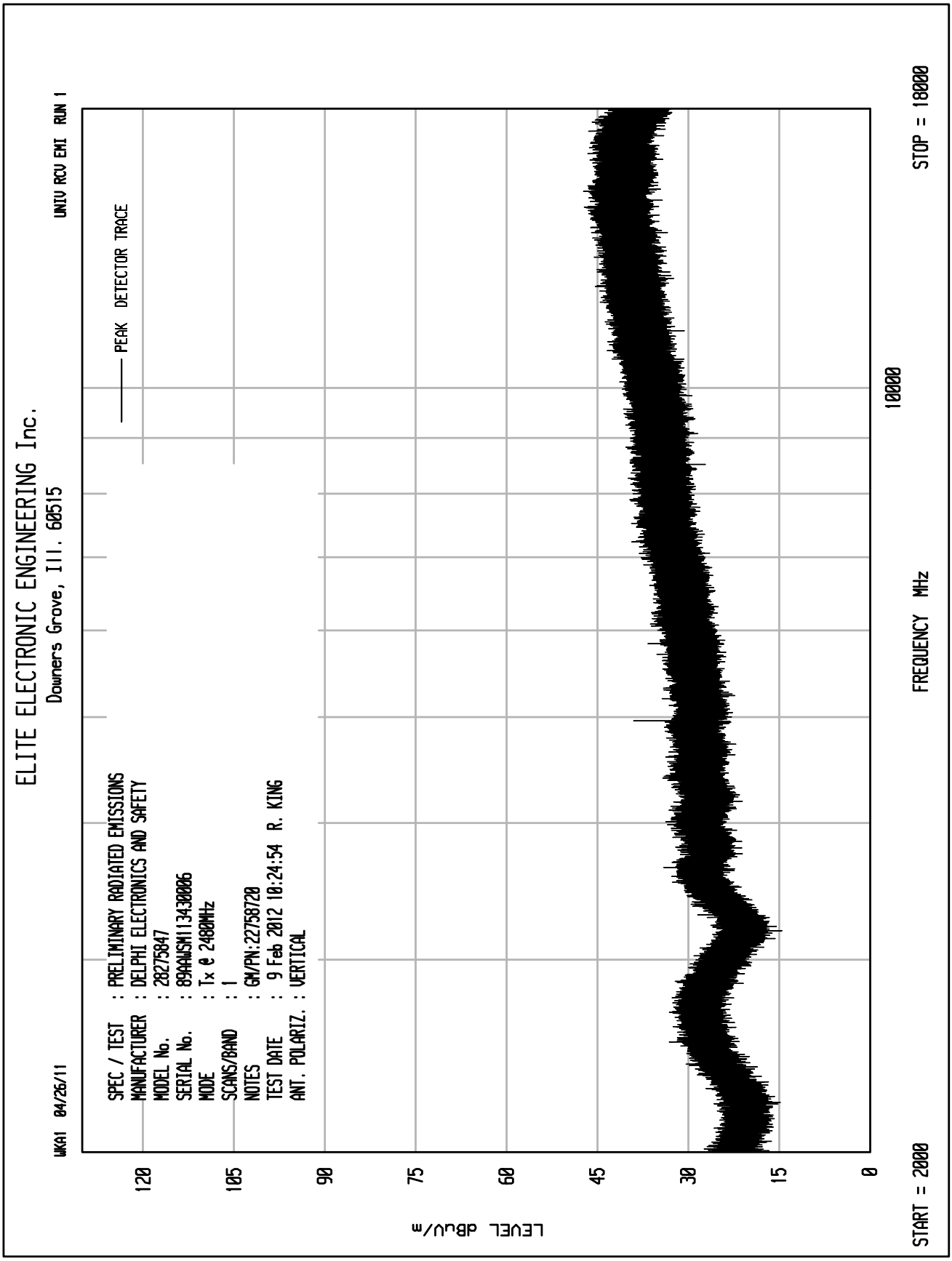

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 14
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:19:38 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

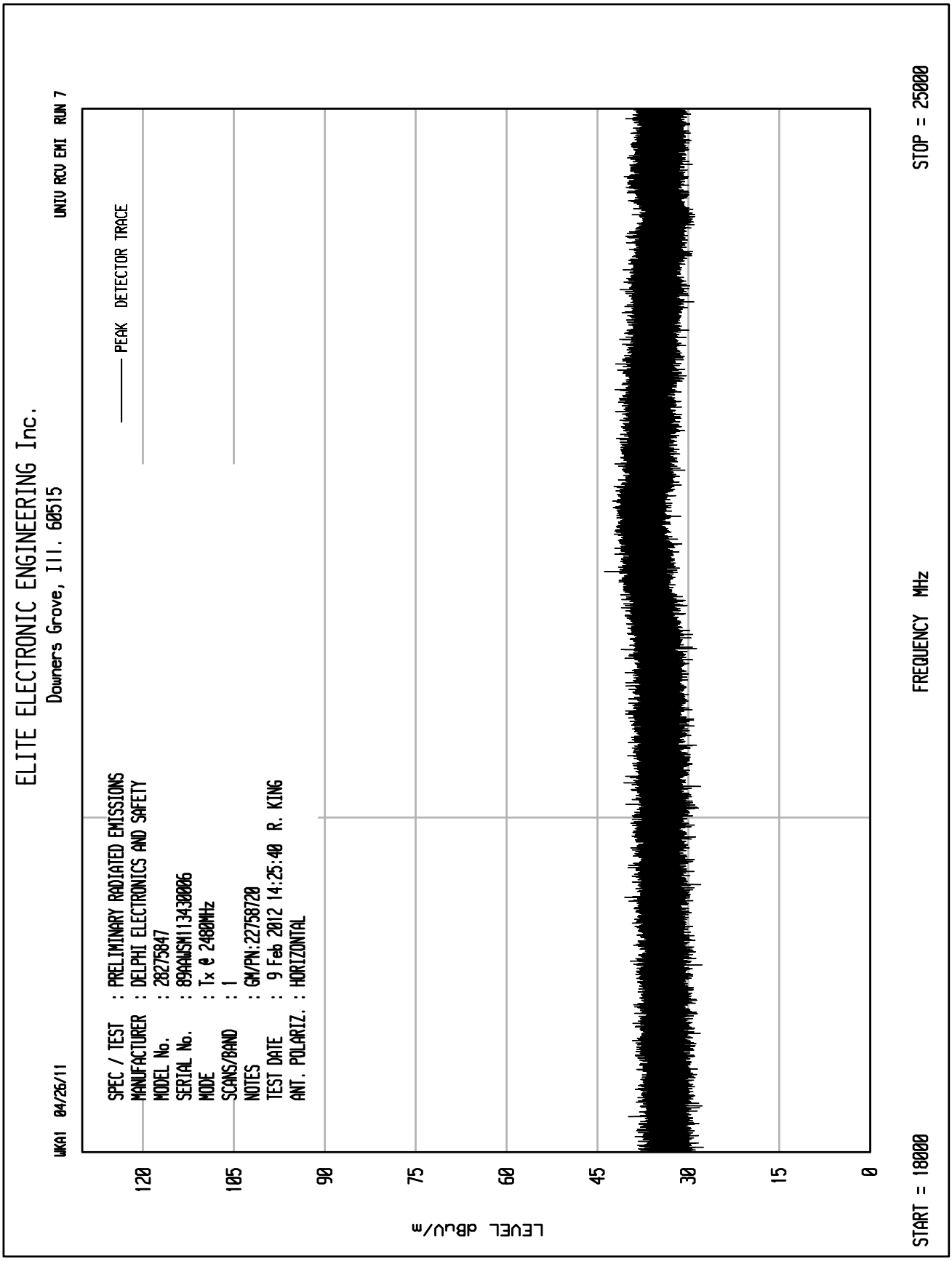

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 15
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 16:21:31 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 30
100
FREQUENCY MHz
STOP = 1000

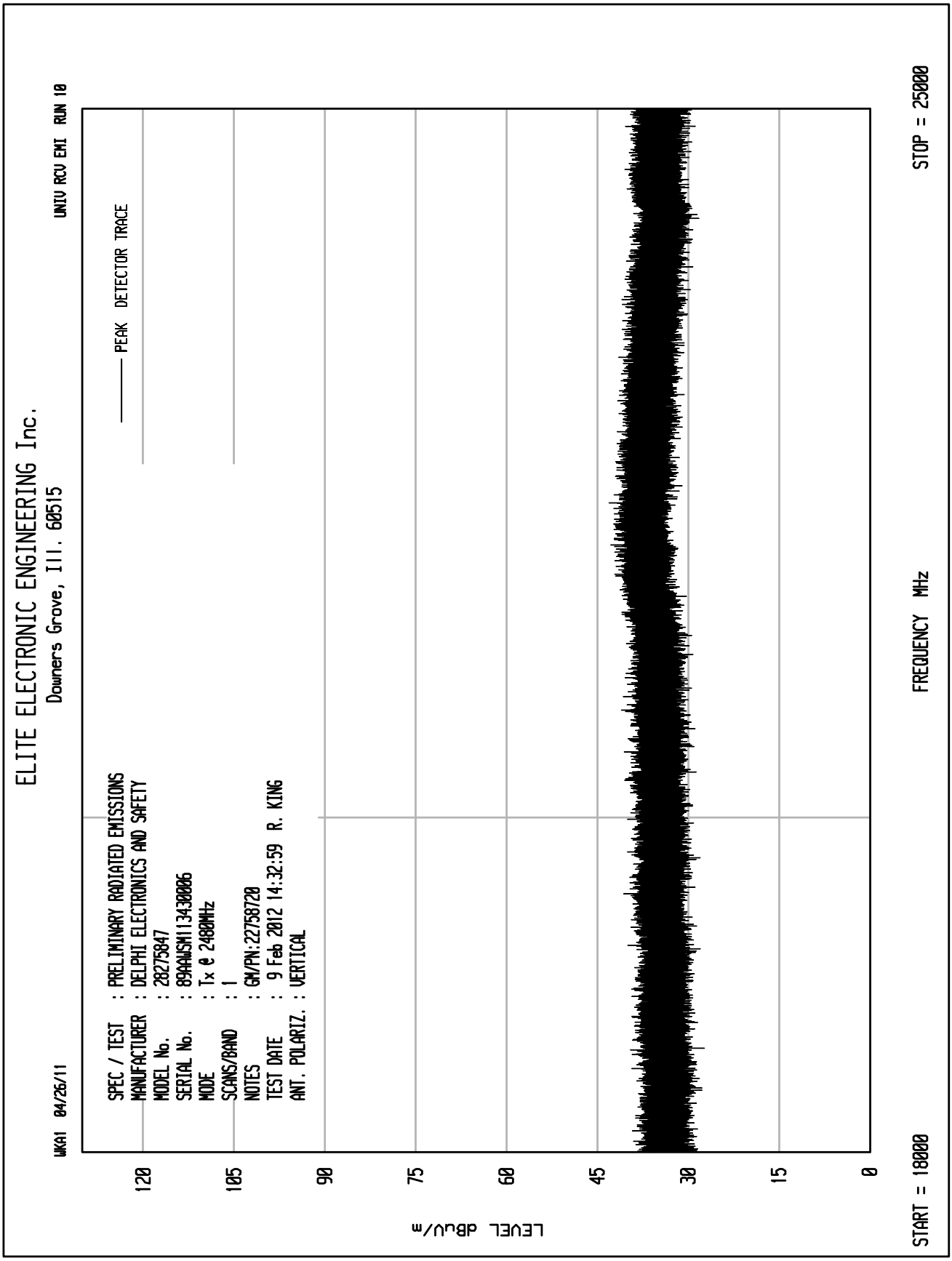

ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 6
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:32:01 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/26/11
SPEC / TEST : PRELIM RADIATED EMISSIONS
MANUFACTURER : DELPHI SAFETY AND ELECTRONIC
MODEL No. : 28275847
SERIAL No. : 89AAWSM1134300B6
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 10 Feb 2012 14:34:54 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 1000
FREQUENCY MHz
STOP = 3000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 2
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 10:31:08 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 1
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 10:24:54 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 2000
10000
STOP = 18000
FREQUENCY MHz


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 7
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:25:40 R. KING
ANT. POLARIZ. : HORIZONTAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000


ELITE ELECTRONIC ENGINEERING Inc.
Downers Grove, Ill. 60515
UNIV RCV EMI RUN 10
WKA1 04/26/11
SPEC / TEST : PRELIMINARY RADIATED EMISSIONS
MANUFACTURER : DELPHI ELECTRONICS AND SAFETY
MODEL No. : 28275847
SERIAL No. : 89AAWSM113430006
MODE : Tx @ 2480MHz
SCANS/BAND : 1
NOTES : GM/PN:22758720
TEST DATE : 9 Feb 2012 14:32:59 R. KING
ANT. POLARIZ. : VERTICAL
PEAK DETECTOR TRACE
LEVEL dBuV/m
120
105
90
75
60
45
30
15
0
START = 18000
FREQUENCY MHz
STOP = 25000

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2402MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

		Meter		CBL	Ant	Pre	Total	Total	Limit	
Freq	Ant	Reading		Fac	Fac	Amp	dBuV/m	uV/m	uV/m	Margin
(MHz)	Pol	(dBuV)	Ambient	(dB)	(dB)	(dB)	at 3 M	at 3M	at 3M	(dB)
67.00	H	33.0		0.5	6.2	0.0	39.7	96.9	100.0	-0.3
67.00	V	26.0		0.5	6.2	0.0	32.7	43.3	100.0	-7.3
99.10	H	30.0		0.5	11.1	0.0	41.6	120.6	150.0	-1.9
99.10	V	31.0		0.5	11.1	0.0	42.6	135.3	150.0	-0.9
156.00	H	25.0		0.8	10.9	0.0	36.8	68.9	150.0	-6.8
156.00	V	26.0		0.8	10.9	0.0	37.8	77.3	150.0	-5.8
167.00	H	29.0		0.9	10.5	0.0	40.3	103.9	150.0	-3.2
167.00	V	31.5		0.9	10.5	0.0	42.8	138.5	150.0	-0.7
467.00	H	23.9		1.5	17.5	0.0	42.9	139.3	200.0	-3.1
467.00	V	25.0		1.5	17.5	0.0	44.0	158.1	200.0	-2.0

H – Horizontal V – Vertical

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2402MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2402.00	H	59.0		3.4	31.3	0.0	93.7	48508.3		
2402.00	V	57.9		3.4	31.3	0.0	92.6	42836.7		
4804.00	H	49.2		4.9	34.8	-39.2	49.7	306.5	5000.0	-24.2
4804.00	V	47.1		4.9	34.8	-39.2	47.7	242.4	5000.0	-26.3
7206.00	H	45.6	*	6.1	38.1	-39.4	50.4	330.2	4850.8	-23.3
7206.00	V	43.9	*	6.1	38.1	-39.4	48.7	271.5	4850.8	-25.0
9608.00	H	45.4	*	6.8	39.6	-39.3	52.6	424.3	4850.8	-21.2
9608.00	V	46.3	*	6.8	39.6	-39.3	53.4	468.4	4850.8	-20.3
12010.00	H	44.9	*	8.0	41.4	-38.4	55.9	625.1	5000.0	-18.1
12010.00	V	44.7	*	8.0	41.4	-38.4	55.7	606.6	5000.0	-18.3
14412.00	H	45.3	*	8.7	43.6	-38.5	59.2	910.8	4850.8	-14.5
14412.00	V	45.4	*	8.7	43.6	-38.5	59.3	918.2	4850.8	-14.5
16814.00	H	44.9	*	9.4	44.8	-37.2	61.9	1246.1	4850.8	-11.8
16814.00	V	43.9	*	9.4	44.8	-37.2	60.9	1109.3	4850.8	-12.8
19216.00	H	35.7	*	2.2	40.4	-27.5	50.8	346.6	5000.0	-23.2
19216.00	V	35.7	*	2.2	40.4	-27.5	50.8	346.6	5000.0	-23.2
21618.00	H	25.9	*	2.2	40.6	-26.2	42.5	133.4	4850.8	-31.2
21618.00	V	25.9	*	2.2	40.6	-26.2	42.5	133.4	4850.8	-31.2
24020.00	H	26.4	*	2.2	40.6	-27.4	41.9	123.8	4850.8	-31.9
24020.00	V	26.4	*	2.2	40.6	-27.4	41.9	123.8	4850.8	-31.9

Gray rows indicate emissions in a restricted band

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB)

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2402MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4804.0	H	49.2		4.9	34.8	-39.2	-42.6	7.1	2.3	500.0	-46.8
4804.0	V	47.1		4.9	34.8	-39.2	-42.6	5.1	1.8	500.0	-48.9
12010.0	H	44.9	*	8.0	41.4	-38.4	-42.6	13.3	4.6	500.0	-40.7
12010.0	V	44.7	*	8.0	41.4	-38.4	-42.6	13.1	4.5	500.0	-40.9
19216.0	H	35.7	*	2.2	40.4	-27.5	-42.6	8.2	2.6	500.0	-45.8
19216.0	V	35.7	*	2.2	40.4	-27.5	-42.6	8.2	2.6	500.0	-45.8

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB) + Duty Cycle(dB)

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2441MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2441.00	H	59.3		3.4	31.3	0.0	94.1	50566.3		
2441.00	V	58.7		3.4	31.3	0.0	93.4	46974.4		
4882.00	H	46.0		4.9	34.9	-39.2	46.6	212.9	5000.0	-27.4
4882.00	V	50.9		4.9	34.9	-39.2	51.5	375.5	5000.0	-22.5
7323.00	H	45.4	*	6.2	38.2	-39.4	50.3	328.1	5000.0	-23.7
7323.00	V	46.0	*	6.2	38.2	-39.4	51.0	353.2	5000.0	-23.0
9764.00	H	46.7	*	6.9	39.8	-39.1	54.3	517.1	5056.6	-19.8
9764.00	V	46.8	*	6.9	39.8	-39.1	54.3	519.5	5056.6	-19.8
12205.00	H	44.9	*	8.0	41.5	-38.5	55.8	619.7	5000.0	-18.1
12205.00	V	46.4	*	8.0	41.5	-38.5	57.4	739.0	5000.0	-16.6
14646.00	H	45.9	*	8.8	44.1	-38.5	60.3	1033.5	5056.6	-13.8
14646.00	V	45.4	*	8.8	44.1	-38.5	59.8	980.2	5056.6	-14.3
17087.00	H	44.5	*	9.5	44.7	-37.0	61.7	1214.5	5056.6	-12.4
17087.00	V	44.6	*	9.5	44.7	-37.0	61.8	1231.4	5056.6	-12.3
19528.00	H	35.7	*	2.2	40.4	-27.2	51.1	359.6	5000.0	-22.9
19528.00	V	35.7	*	2.2	40.4	-27.2	51.1	359.6	5000.0	-22.9
21969.00	H	25.9	*	2.2	40.6	-26.9	41.7	122.3	5056.6	-32.3
21969.00	V	25.9	*	2.2	40.6	-26.9	41.7	122.3	5056.6	-32.3
24410.00	H	26.4	*	2.2	40.6	-27.5	41.8	122.8	5056.6	-32.3
24410.00	V	26.4	*	2.2	40.6	-27.5	41.8	122.8	5056.6	-32.3

Gray rows indicate emissions in a restricted band

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB)

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2441MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4882.0	H	46.0		4.9	34.9	-39.2	-42.6	4.0	1.6	500.0	-50.0
4882.0	V	50.9		4.9	34.9	-39.2	-42.6	8.9	2.8	500.0	-45.1
7323.0	H	45.4	*	6.2	38.2	-39.4	-42.6	7.7	2.4	500.0	-46.3
7323.0	V	46.0	*	6.2	38.2	-39.4	-42.6	8.4	2.6	500.0	-45.6
12205.0	H	44.9	*	8.0	41.5	-38.5	-42.6	13.2	4.6	500.0	-40.7
12205.0	V	46.4	*	8.0	41.5	-38.5	-42.6	14.8	5.5	500.0	-39.2
19528.0	H	35.7	*	2.2	40.4	-27.2	-42.6	8.5	2.7	500.0	-45.5
19528.0	V	35.7	*	2.2	40.4	-27.2	-42.6	8.5	2.7	500.0	-45.5

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB) + Duty Cycle(dB)

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2480MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2480.00	H	56.4		3.5	31.4	0.0	91.2	36504.8		
2480.00	V	55.4		3.5	31.4	0.0	90.2	32535.0		
4960.00	H	52.9		5.0	34.9	-39.3	53.5	473.9	5000.0	-20.5
4960.00	V	48.9		5.0	34.9	-39.3	49.5	299.0	5000.0	-24.5
7440.00	H	46.7	*	6.2	38.2	-39.3	51.8	390.6	5000.0	-22.1
7440.00	V	46.2	*	6.2	38.2	-39.3	51.3	368.8	5000.0	-22.6
9920.00	H	45.9	*	7.0	39.9	-39.0	53.8	489.5	3650.5	-17.5
9920.00	V	46.2	*	7.0	39.9	-39.0	54.1	506.7	3650.5	-17.2
12400.00	H	46.2	*	8.0	41.5	-38.6	57.1	720.1	5000.0	-16.8
12400.00	V	46.9	*	8.0	41.5	-38.6	57.8	780.5	5000.0	-16.1
14880.00	H	45.3	*	8.9	44.6	-38.4	60.4	1043.6	3650.5	-10.9
14880.00	V	44.4	*	8.9	44.6	-38.4	59.5	940.9	3650.5	-11.8
17360.00	H	45.7	*	9.7	44.6	-37.2	62.8	1383.1	3650.5	-8.4
17360.00	V	45.9	*	9.7	44.6	-37.2	63.0	1415.3	3650.5	-8.2
19840.00	H	35.7	*	2.2	40.4	-26.9	51.4	372.3	5000.0	-22.6
19840.00	V	35.7	*	2.2	40.4	-26.9	51.4	372.3	5000.0	-22.6
22320.00	H	25.9	*	2.2	40.6	-27.1	41.6	120.6	5000.0	-32.4
22320.00	V	25.9	*	2.2	40.6	-27.1	41.6	120.6	5000.0	-32.4
24800.00	H	26.4	*	2.2	40.7	-27.2	42.1	126.8	3650.5	-29.2
24800.00	V	26.4	*	2.2	40.7	-27.2	42.1	126.8	3650.5	-29.2

Gray rows indicate emissions in a restricted band

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB)

Checked BY Richard E. King :

Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2480MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Industry Canada RSS-210 Annex 8 Spurious Radiated Emissions
: FCC CFR Title 47 Part 15, Subpart C, Paragraph 15.247 Spurious Radiated Emissions

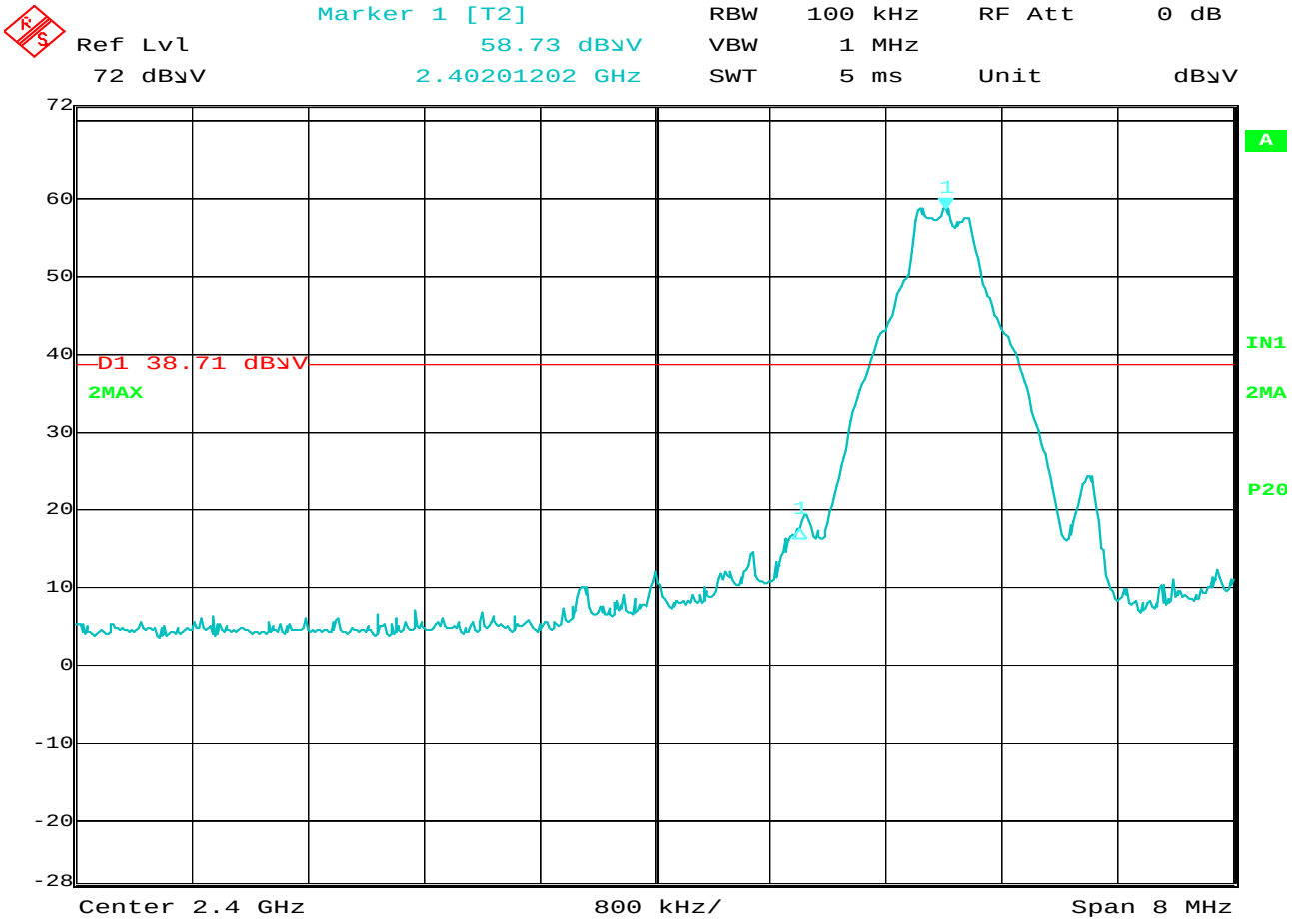
Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Pre Amp (dB)	Duty Cycle (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
4960.0	H	52.9		5.0	34.9	-39.3	-42.6	10.9	3.5	500.0	-43.1
4960.0	V	48.9		5.0	34.9	-39.3	-42.6	6.9	2.2	500.0	-47.1
7440.0	H	46.7	*	6.2	38.2	-39.3	-42.6	9.2	2.9	500.0	-44.7
7440.0	V	46.2	*	6.2	38.2	-39.3	-42.6	8.7	2.7	500.0	-45.2
12400.0	H	46.2	*	8.0	41.5	-38.6	-42.6	14.5	5.3	500.0	-39.4
12400.0	V	46.9	*	8.0	41.5	-38.6	-42.6	15.2	5.8	500.0	-38.7
19840.0	H	35.7	*	2.2	40.4	-26.9	-42.6	8.8	2.8	500.0	-45.2
19840.0	V	35.7	*	2.2	40.4	-26.9	-42.6	8.8	2.8	500.0	-45.2
22320.0	H	25.9	*	2.2	40.6	-27.1	-42.6	-1.0	0.9	500.0	-55.0
22320.0	V	25.9	*	2.2	40.6	-27.1	-42.6	-1.0	0.9	500.0	-55.0

H – Horizontal V – Vertical

Total (dBuV/m) = Meter Reading (dBuV) + Cbl Fac (dB) + Ant Fac (dB) + Pre Amp Gain (dB) + Duty Cycle(dB)

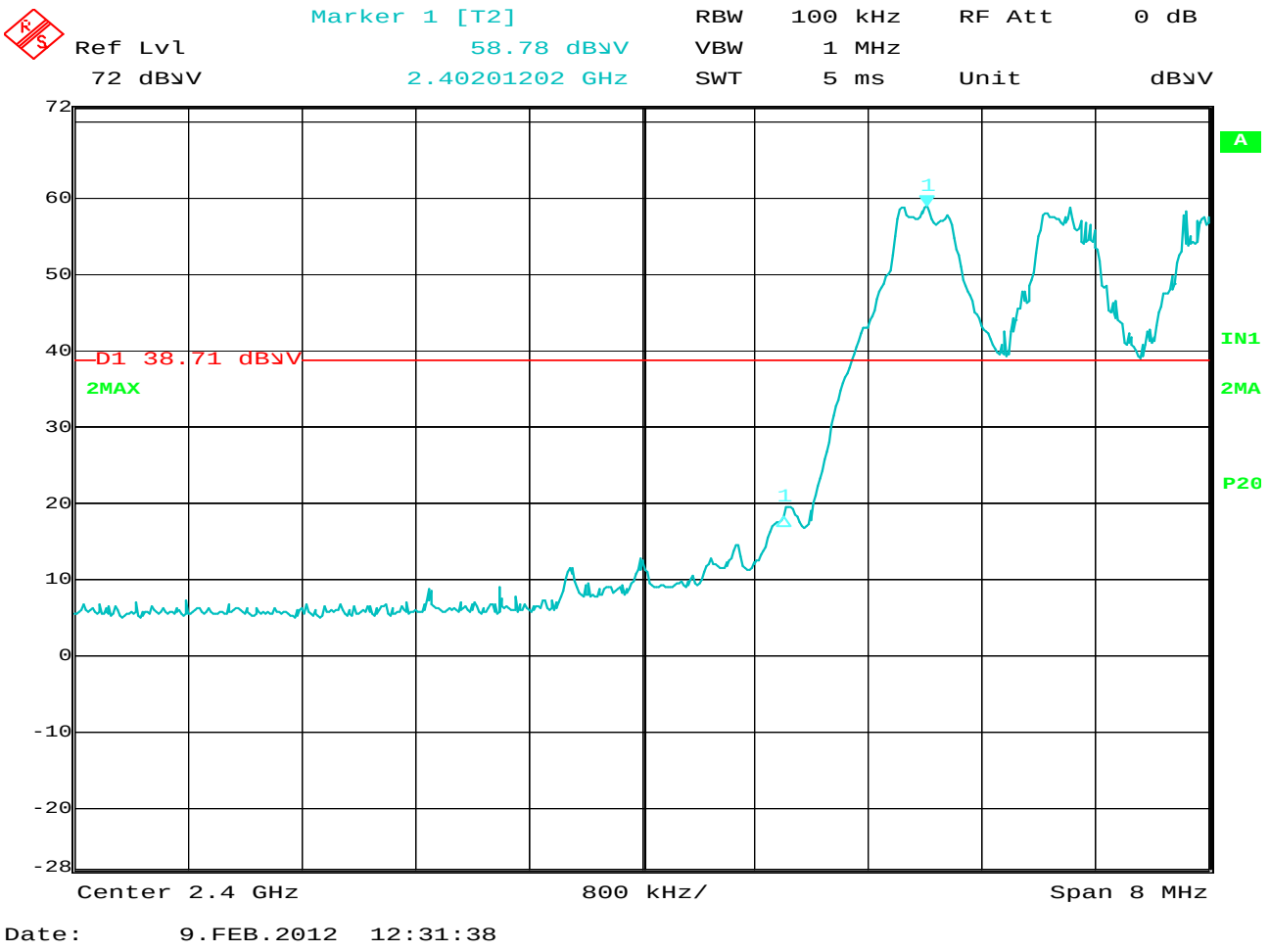
Checked BY Richard E. King :

Richard E. King



15.247 Bandedge Compliance

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
TEST PARAMETERS	:	Bandedge Compliance
EUT FREQUENCY	:	Tx 2402 MHz
NOTES	:	



15.247 Bandedge Compliance

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
TEST SPEC.	:	FCC 15.247
TEST PARAMETERS	:	Bandedge Compliance
EUT FREQUENCY	:	Hopping Enabled
NOTES	:	

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2480MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Band Edge at 2483.5MHz
NOTES : Peak Detector

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.50	H	17.6		3.5	31.4	52.5	420.9	5000.0	-21.5
2483.50	V	17.0		3.5	31.4	51.8	389.6	5000.0	-22.2

Checked BY Richard E. King :

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MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Transmit at 2480MHz
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Band Edge at 2483.5MHz

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.50	H	11.5		3.5	31.4	46.4	207.8	500.0	-7.6
2483.50	V	11.0		3.5	31.4	45.9	196.2	500.0	-8.1

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MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Hopping Enabled
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Band Edge at 2483.5MHz

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.50	H	15.0		3.5	31.4	49.9	310.9	5000.0	-24.1
2483.50	V	15.0		3.5	31.4	49.9	310.9	5000.0	-24.1

Checked BY Richard E. King :

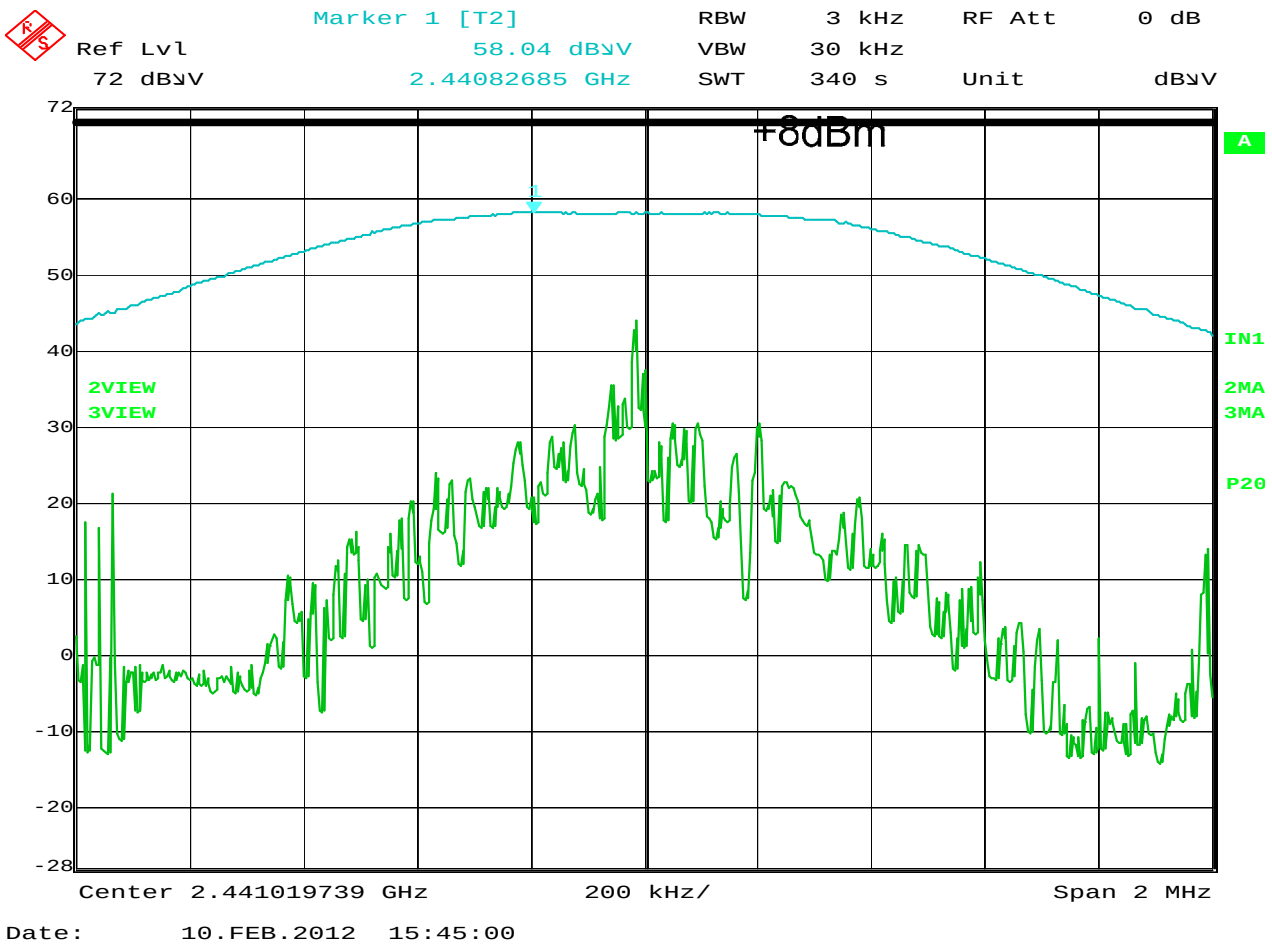
Richard E. King

MANUFACTURER : Delphi Electronics and Safety
EUT : Car Radio
MODEL NUMBER : 28275847
TEST MODE : Hopping Enabled
TEST DATE : Feb. 9, 2012
TEST PARAMETERS : Band Edge at 2483.5MHz

Freq (MHz)	Ant Pol	Meter Reading (dBuV)	Ambient	CBL Fac (dB)	Ant Fac (dB)	Total dBuV/m at 3 M	Total uV/m at 3M	Limit uV/m at 3M	Margin (dB)
2483.50	H	11.0		3.5	31.4	45.9	196.2	500.0	-8.1
2483.50	V	11.0		3.5	31.4	45.9	196.2	500.0	-8.1

Checked BY Richard E. King :

Richard E. King



Power Spectral Density

MANUFACTURER	:	Delphi Electonics and Safety
MODEL NUMBER	:	28275847
EUT FREQUENCY	:	Tx @ 2441MHz
NOTES	:	58.04 dBuV/m = EIRP -7.8 dBm, 8 dBm limit is equal to 73.84dBuV/m